# THE AMERICAN JOURNAL OF PHARMACY.

PUBLISHED BY AUTHORITY OF THE

PHILADELPHIA COLLEGE OF PHARMACY.

EDITED BY

HENRY TRIMBLE.

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VOLUME 69.

PHILADELPHIA:

1897.


EUCALYPTUS ROSTRATA, SCHLECHT. MURRAY RED GUM.

*A*, flower buds; *B*, fruits; *C*, part of leaf, magnified to show venation.

# THE AMERICAN JOURNAL OF PHARMACY

*JANUARY, 1897.*

## THE MURRAY RED GUM (EUCALYPTUS ROSTRATA, SCHLECHT) AND ITS KINO.

BY J. H. MAIDEN,

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*Aboriginal Names.*—By the aboriginals of the lower Murrumbidgee it used to go by the name of "Biall," while to those of the western interior it was known as "Yarrah," a name which it shared with some other trees. The specific name, *rostrata* (beaked), is in allusion to the way in which the operculum is drawn out to a point like a beak or snout, as shown in the figure.

*Other Vernacular Names.*—Besides being known as "Red Gum," it is the "Flooded Gum" of the interior of Western and South Australia. In western New South Wales it is called "Creek Gum," as it is always found near watercourses. There are several trees which grow under the name of "Red Gum" in these colonies. One of them is the smooth-barked apple, Angophora lanceolata, which, in New South Wales, is often called red gum, but most of the trees known by that name are Eucalypts. The red gum of Western Australia is Eucalyptus calophylla, while in the neighborhood of St. Vincent's Gulf, South Australia, Eucalyptus odorata goes by that name. In New South Wales two other valuable timbers also go under the name of red gum, viz.: Eucalyptus tereticornis, a tree bearing close affinity to rostrata, but it is essentially a forest timber, in contradistinction to rostrata, which is a river timber. Then the leather-jacket or gray gum, E. punctata, is also known as red gum occasionally; but the red gum par excellence of these colonies is Eucalyptus rostrata, and by way of distinction I have denoted it—on account of its most celebrated locality—Murray Red Gum.

*Meaning of the Term Gum as Applied to Eucalyptus Trees.*—We have a very large number of species of the protean genus Eucalyptus, and they differ very much amongst themselves in (amongst other things) their barks. Some of them have rugged, dense, hard barks, and are known as "iron barks." Others have very fibrous barks, which strip off in long pieces, and even sheets, used for roofing in the country; these are called "stringy barks." Others have woolly, matted barks, and are known as "box." All these, and many others, belong to the rough-barked Eucalypts. But others have smooth barks, smooth as a planed board, and go by the name of "gums" or "gum trees." Now the rough-barked species produce gum (kino) as abundantly, and often more so, than the smooth-barked ones, but the stain of the gum is more apparent on the latter, and that is why, I believe, the term "gum" has come to be exclusively applied, in common parlance, to the smooth-barked forms.

Having distinguished these two great classes, the "gums" are still further discriminated by means of various adjectives, some referring to color, *e. g.*, "white," referring to the color of the bark; "blue," referring to the tint of the bark or the glaucous appearance of the leaves; "red," referring to the color of the wood, and so on. And, inasmuch as we have several red gums, I have proposed to permanently define E. rostrata as "Murray red gum," for the reason already indicated. "Red gum" being thus the name of the tree, "red-gum kino" becomes the name of its product, in spite of its apparent tautology. It should strictly be written "red-gum kino" —not "red gum-kino."

*How Red-Gum Kino Is Collected.*—The manner in which the kino is procured is as follows: The men employed in getting it look for the trees from which the substance is or has recently been exuding, and cut into the tree until they get beyond the gum-vein; they then insert a piece of tin (trough-shaped) into the cut or hole, and let the kino run into a bucket or kerosene tin.[1]

[1] Kerosene tins are rectangular in shape, and hold about 2 gallons; in them the kerosene (called paraffin oil in England) is imported from the United States, and the kerosene, in these original packages, finds its way into the remotest parts of the colonies. When the top is cut off and a wire handle fixed across, we have a rough-and-ready pail, which is used in Australia for many purposes of collection and storage, such as the case we have under consideration now.

When the kino exudes it is of the consistency of molasses, and has a sourish odor. In a few days it dries into a solid mass, which subsequently becomes quite friable. It is owing to this property (shared by other kinos of my "turbid group") that it cannot be collected in an indurated condition by simple picking from the bark of the trees, as can kinos belonging to my "ruby" and "gummy groups," which do not become friable with age.

As much as 4 gallons have been procured from one tree, but this is exceptional. On an average, not more than 1 quart per tree is obtained, and from the majority of trees no appreciable quantity of kino is obtained by tapping. Many are all but free from it.

The usual price paid on the Murray River at the present time, for liquid kino (before induration) is 7d. per pound, and a large quantity could be forthcoming at that price, if a steady demand were to set in for it. A good workingman can procure between 10 and 12 pounds per day of the liquid kino. It loses but little weight in drying.

The kino of the red gum is perhaps the best known of all Eucalyptus kinos. The following notes of it were published by me in the *Proceedings of the Linnean Society of New South Wales* for September, 1891:

It is a useful astringent, and it seems to be increasing in favor with medical men in England, America and Australia.

The official kino (Pterocarpus) contains, I believe, no substance which is not contained in this and some allied kinos, for which they appear to be a perfect substitute. See *Pharm. Jour.* [3] **20,** 221, 321.

The kino of E. rostrata will be found mentioned in all modern works on Materia Medica. In Martindale and Westcott's *Extra Pharmacopœia*, for instance, we have the following:

"E. rostrata and E. corymbosa, and probably other species imported from Australia. It is semi-translucent and garnet-colored, not so dark as, but resembling, kino in appearance, soluble in water, tough, difficult to powder [not correct as applied to these two kinos. —J. H. M.]; it adheres to the teeth when chewed, is intensely astringent to the mucous membrane, useful in diarrhœa, relaxed throats, and given with success to check the purging of mercurial pills."

But the following statements pertaining to the percentage of tannic acid and the solubility are somewhat misleading, since I have shown

the enormous variation in the properties of kinos caused by age:

"Of 100 parts, 90 are dissolved in cold water, the solution being clear; 27 parts of isinglass precipitate all the astringent matter."—Squire's *Companion to the B. P.*

Dr. Wiesner says of a sample:

"Easily soluble in water and alcohol; solution neutral, free from gum resin. Broken masses of zircon-red, sometimes light brown, mixed with bits of bark."

Following are experiments on "Red Gum" kino purchased in Sydney, November 22, 1888, of Victorian origin: In lumps up to the size of peas, though angular. Prevailing color, purplish-brown; is readily powdered between the fingers, forming an ochrey-brown powder. The mass of kino has not the brilliant appearance of the kinos of the ruby group, owing to this friability.

In cold water it dissolves fairly readily, and almost entirely to a reddish-brown liquid.

Its composition (determined November, 1888) is:

| | |
|---|---|
| Catechin and tannic acid | 84·3 |
| Ligneous matter, etc. | ·3 |
| Moisture | 15·2 |
| Ash | ·2 |
| | 100·00 |

Tannic acid determination (Löwenthal), 46·22 per cent.

A specimen of kino from the "Creek Gum," Tarella, Wilcannia, August 23, 1887 (diameter, 1–2 feet; height, 30–40 feet), gave the following results: it is only obtainable in rather small quantities and in rather small pieces; pale, as kinos go, very bright-looking, and of a ruby color; powders fairly readily, forming a powder of a light-brown tint. It dissolves almost immediately to a pale brownish or almost orange solution, leaving a sediment of a whitish-salmon color with a few dark-colored particles, like those of E. goniocalyx, only cleaner-looking.

Its composition, determined October, 1888, is:

| | |
|---|---|
| Catechin and tannic acid | 82·7 |
| Ligneous matter, etc. | ·6 |
| Moisture | 15·8 |
| Ash | ·9 |
| | 100·00 |

Tannic acid determination (Löwenthal), 47·746 per cent.

Since the above observations were made, H. G. Smith and the writer[1] have been re-examining Eucalyptus kinos. These researches have been continued by Mr. H. G. Smith.[2] From these papers it will be seen that certain kinos of the "Turbid" group contain new organic bodies, Eudesmin or Aromadendrin, or a mixture of both. All the kinos of this group (of which E. rostrata is a member) are at the present time being examined with the view to ascertain whether they contain these new substances, and in what quantities. In the first broad grouping of these kinos, Catechin was (from imperfect investigation) stated to be present.

*Why Eucalyptus Rostrata Kino is Usually Chosen for Medicinal Purposes.*—Because this species is very gregarious, it cannot, in the districts in which it occurs, be mistaken for any other species, and because it is a comparatively free yielder of kino. All these are important practical considerations, apart from the properties of E. rostrata kino itself. The discrimination of the various species of Eucalyptus in a forest is so difficult that considerable botanical knowledge would be required in the case of a kino collector who might be set to the task of collecting kinos true to name. As a matter of fact, such men are not available for the work of kino collecting in a mixed Eucalyptus forest.

*Eucalyptus Rostrata and Its Oil.*—In passing, the following notes may be useful:

The leaves of the red gum emit a pleasant odor when crushed in the hand, but the Eucalyptus oil they contain is not a regular article of commerce, as it is not yielded in payable quantity. Mr. Bosisto thus reports on it in the *Trans. Roy. Soc. of Victoria*, Vol. VI, 1861–4: "Plants grown on high ground give an oil of a dark amber color, possessing an agreeable aromatic flavor, and having the odor of caraways. The yield from 100 pounds of the fresh-gathered leaves was 1 ounce 6 drachms. The plants grown on low marshy soil yielded an oil of a pale-yellow color, in appearance and smell similar to that yielded by E. odorata, the quantity being 9⅓ drachms to 100 pounds." Last year M. Mellon, of the Dunolly Scent Farm,

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[1] A Contribution to the Chemistry of Australian Myrtaceous Kinos. *Proc. Royal Society N. S. W.*, 29, 30 (1895).

[2] On Aromadendrin or Aromadendric Acid from the Turbid Group of Eucalyptus Kinos. *Proc. Royal Soc. N. S. W.*, 30, 135 (1896).

Victoria, obtained no less than ·7 ounces of oil per 100 pounds of leaves.

In Mueller's edition of Wittstein's work we find the following:

"The essential oil is pale yellow to reddish amber in color; it smells and tastes like that of E. odorata. Its specific gravity is 0·918, and it boils at 137° to 181° C."

The celebrated essential oil firm of Schimmel & Co., of Leipzig, Germany, have also examined this oil (*vide* their *Bericht* for October, 1891). Their oil was prepared by M. E. Mojon, of Algiers, from trees grown in that country. They determined the specific gravity of their sample to be 0·924 at 15° C., and the optical activity + 12° 58′ in a 100-millimetre tube. The oil has a powerful odor of valerianic aldehyde, and is rich in cineol. E. rostrata and E. globulus appear to be the only two eucalyptus oils known to contain valerianic aldehyde up to the present.

Quite recently, Mr. W. Percy Wilkinson, of Melbourne, has made a valuable preliminary investigation of the Eucalyptus oils of Victoria (*Proc. Roy. Soc., Victoria*, 1893, p. 195). Amongst others, he has examined three specimens of red gum oil, and following are his results:

| Sample. | Specific Gravity. | Specific Rotation. | Refractive Index. | Specific Refractive Energy. |
|---|---|---|---|---|
| 1 . . . . . . . . . | ·9120 | + 8·7° | 1·4604 | ·5072 |
| 2 . . . . . . . . | ·9216 | + 2·2° | 1·4600 | ·5014 |
| 3 . . . . . . . . . | ·9222 | + 0·5° | 1·4607 | ·5018 |

None of them gave the phellandrene reaction.

*Eucalyptus Rostrata. Where Found.*—It is widely distributed in Australia, usually on the banks of rivers, or on river-flats subject to inundation, or in old water-courses. It becomes dwarfed in the interior; but it attains its greatest development on the banks of the Murray River, where, on the New South Wales side, there are millions of acres of land which are periodically flooded (hence the name, "flooded gum," often applied to this species), and hence unsuited to agriculture. On this land are countless millions of red gum trees, the cutting of whose timber affords a large revenue to the New

South Wales Government. On this flooded land the propagation of the tree is largely unchecked, and so the production of timber—and, indirectly, of kino—is practically unlimited.

The Murray River is a river nearly 2,000 miles long. It forms the greater part of the boundary between the colonies of New South Wales and Victoria. There is comparatively little red gum on the Victorian side, but in New South Wales territory it is very abundant.

Beyond the Dividing Range, in New South Wales, the red gum has a very wide range, being found on the banks of the Cudgegong, Castlereagh, Darling, etc. It is also sparingly found in the coast country, except from the Victorian boundary to the Bega district. In Victoria it is found on river-flats and open valleys in most parts of the colony, and in South Australia it is likewise very extensively distributed. It is also found in southwest Queensland.

The way in which the red gum (yarra) usually marks the course of water was early observed by Sir Thomas Mitchell: "The yarra grew here (Lachlan), as on the Darling, to a gigantic size, the height sometimes exceeding 100 feet. The yarra is certainly a pleasing object in various respects; its shining bark and lofty height inform the traveller of a distant probability of water or, at least, of the bed of a river or lake, and, being visible over all other trees, it usually marks the course of the rivers so well that, in travelling along the Darling and Lachlan, I could trace with ease the general course of the river without approaching its banks until I wished to encamp." ("Three Expeditions," ii, 54.)

This useful tree has been introduced into several countries (chiefly through the agency of Baron von Mueller), with varying success. For particulars of most of the results, see Mueller's "Select Extra-Tropical Plants" (Victorian Edition). For results in Assam, see *Kew Report* for 1879, p. 16; and for results in India see *Kew Reports:* 1876, p. 23; 1879, p. 16; 1881, p. 12. Vilmorin, of Paris, has distributed a good deal of red gum in Europe. Some years ago I received, from a correspondent at Oporto, in Portugal, flowers and fruits raised from such seed, with the report that the species does well in that country. The red gum has been planted by a number of people in California, and is favorably reported upon by the local forest conservator. For an account of its growth in that State, reference may be made to the very interesting monograph on "Eucalyptus," by Mr. Abbot Kinney, of Los Angeles.

# GELSEMIUM.

By L. E. Sayre,
Member of the Research Committee C, of the Committee of Revision of the United States Pharmacopœia.

## RHIZOMES, ROOTS AND STEMS.

Some time ago my attention was called, by members of a class in microscopy, to the varied structure of this drug. Fragments of gelsemium root, handed to the different members of the class, when sectioned and mounted, did not show the same characteristics. This observation led me to examine samples of gelsemium root from different sources, and this forced the conclusion that the gelsemium of the market is composed not only of the rhizome and root, but also of the stem in varying proportions. Furthermore, that the description of the drug, supposing it to be composed of rhizome and root—as is taken for granted by the Pharmacopœia—is somewhat ambiguous and misleading. n the present article a more accurate description of the rhizome and root, and a method of distinguishing both of these from the stem, is suggested.

I am inclined to think that the stem, present to some extent in the commercial drug, is an adulterant. Reassuring myself on this point, I sent a package of the commercial drug to Gerald McCarthy, botanist of the North Carolina Agricultural Experiment Station, asking him to report upon the same. In his response to my letter, he states: "The specimens you submit represent the rhizome and stem respectively, the latter is the specimen with the bast fibres in the cortex. The stem was apparently used to adulterate the rhizome in the original lot. So far as I know, the stem has no medicinal value."

It is an interesting question whether the stem has any medicinal virtue. An investigation has been commenced, by which it is hoped that the relative value of the rhizome, root and stem may be determined.

Collectors in the South have been applied to for authentic specimens. In the meantime the article of the market is being examined. It may be of interest to state that Mr. McCarthy, in his letter, remarks: "The parts of the plant collected here for medicinal use are roots, rhizomes, leaves and flowers."

The description given of gelsemium rhizome and root, in one paragraph, by the U.S.P., 1890, reads as follows: "Cylindrical, long, or

cut in sections, mostly from 5 to 15 millimetres, and occasionally 3 centimetres thick, the roots much thinner, externally light yellowish brown, with purplish-brown longitudinal lines; tough; fracture splintery; bark thin, with silky bast fibres, closely adhering to the

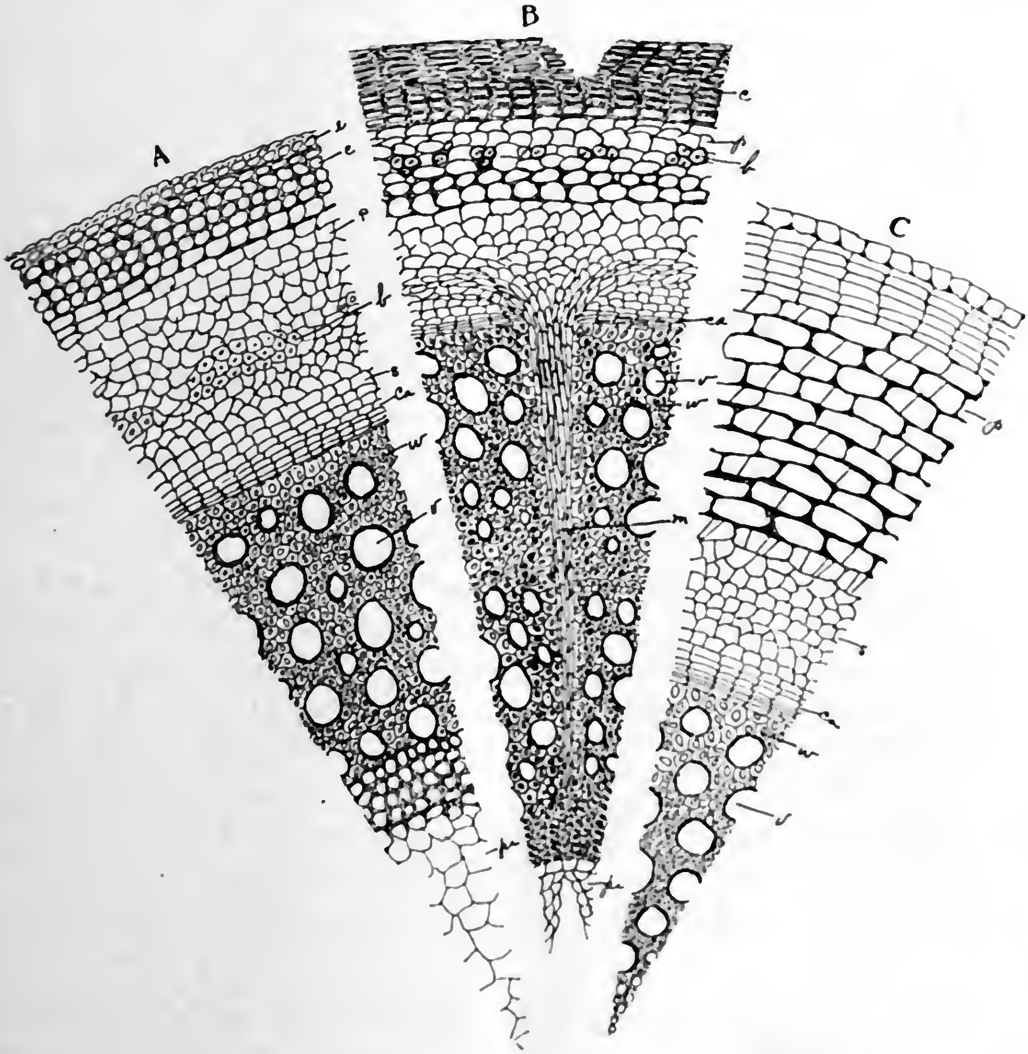


*Fig. 1.*—Cross-sections of Gelsemium sempervirens. *A*, stem; *B*, rhizome; *C*, root.

pale yellowish porous wood, which has fine medullary rays, and in the rhizome a thin pith; odor aromatic, heavy; taste bitter."

It will be noted in the above description that the only distinction made between the root and rhizome is that the latter has a thin pith.

Professor Rothrock (AM. JOUR. PHAR., 1884, p. 130) calls attention to two structural characteristics of stems and roots, which, he

says, are peculiar and of positive value. "The first of these characteristics," he says, "is derived from the medullary rays. These usually widen in a marked manner, going from centre to circumference, being sometimes much more than twice as broad externally as internally. The second characteristic is the tendency of the pith to be penetrated by several plates of large, thin-walled cells, which divide the pith more or less perfectly into four portions. This latter characteristic is always present and plainly enough marked to serve as a means of diagnosis."

This, the author seems to indicate, is a characteristic of the stem

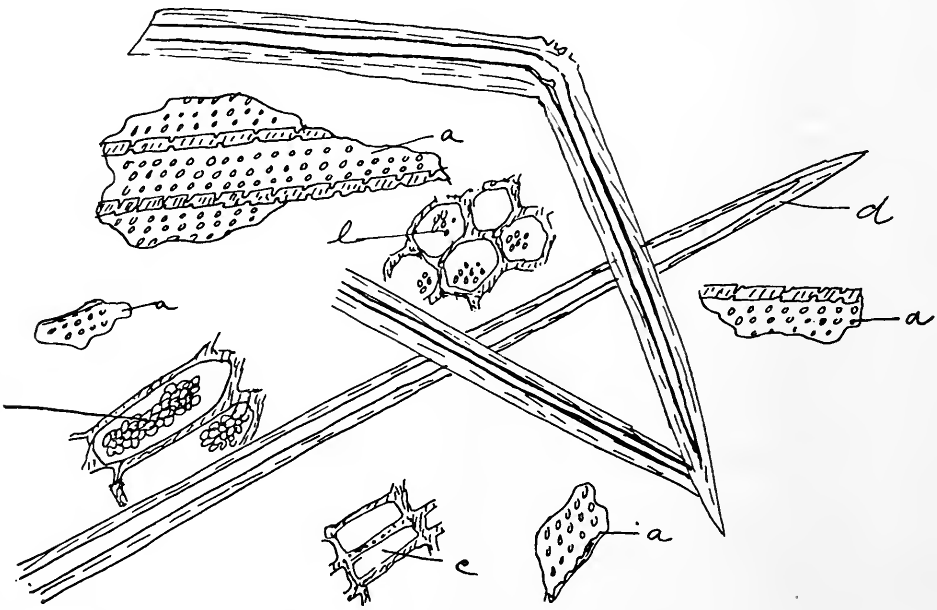


*Fig. 2.*—Gelsemium. Powder of rhizome. *a*, wood tissue; *b*, cell from medullary ray; *c*, cork cells; *d*, bast; *e*, parenchyma of cortex.

and root. It is possible he may have meant by the stem the underground stem or rhizome, for the stem is not official. In either case, whether the stem or rhizome is intended, the statement is inaccurate and misleading, because it does not make distinction between the stem (or rhizome) and root. The United States Dispensatory quotes this description of Professor Rothrock, and does not clear up the ambiguity and inaccuracy. None of the text-books make any more definite and lucid description of the root and rhizome of this plant.

From the growing plant and from the commercial drug numerous sections have been made and examined microscopically. The ac-

companying drawings may, perhaps, more clearly and more briefly describe these three parts of the plant than any written description can do.

In an examination of cross-sections of the stem, rhizome and root of the gelsemium, we find the following microscopical characters and difference of structure. In the stem (*Fig. 1, A*) are found comparatively large bundles of bast (*b*) near the wood, just outside the cambium. In the rhizome (*Fig. 1, B*) the bast is arranged near the corky layer, and in an interrupted ring, rather than in bundles. In

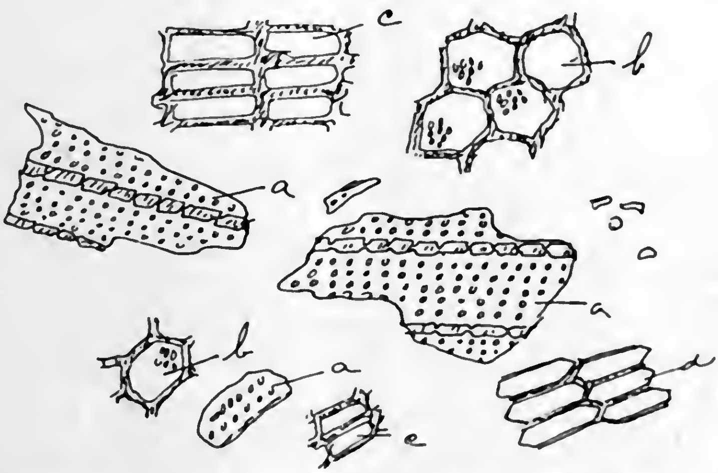


*Fig. 3.*—Gelsemium. Powder of root. *a*, wood tissue; *b*, parenchyma of cortex; *c*, cork cells; *d*, cambium cells.

the root (*Fig. 1, C*) the bast is entirely absent, but there are several layers of cork. The following table shows the corresponding tissues in the three plant parts:

| Stem. | Rhizome. | Root. |
|---|---|---|
| *e*, Epidermis. | Epidermis. | — |
| *c*, Collenchyma. | Collenchyma. | — |
| *p*, Parenchyma. | Parenchyma. | Parenchyma. |
| *b*, Bast. | Bast. | — |
| *s*, Sieve tissue. | Sieve tissue. | Sieve tissue. |
| *ca*, Cambium. | Cambium. | Cambium. |
| *w*, Wood tissue. | Wood tissue. | Wood tissue. |
| *v*, Vascular tubes. | Vascular tubes. | Vascular tubes. |
| *Pi*, Pith. | Pith. | — |
| *m*, Medullary. | Medullary. | — |

*Fig. 4* shows a cross-section of the pith in the rhizome; here the division into four parts is shown. It seems that, as the rhizome advances in age, the pith becomes less and less conspicuous, until

in the larger stems and rhizomes it is almost absent, if not entirely so. In this respect the stem and rhizome are much alike.

The description I have to suggest for gelsemium is as follows: Rhizome cylindrical, long or cut in sections, mostly 5 to 15 millimetres, and occasionally 3 centimetres thick; externally light yellowish brown, with purplish brown longitudinal lines; tough and woody; fracture splintery; bark thin, with silky bast fibres near the pale-yellowish porous wood, which has fine medullary rays, and a small pith which, under the lens, is seen to be usually divided into four segments.

The root is 2 to 10 millimetres thick; externally lighter than the rhizome; fracture brittle; thick bark, closely adhering to the light

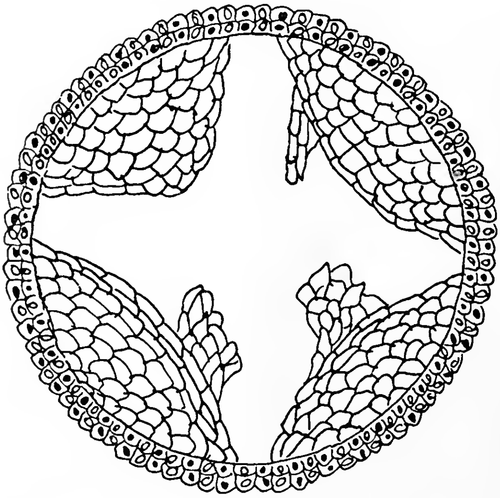

*Fig. 4.*--Gelsemium. Pith of rhizome.

yellowish wood; odor of both rhizome and root aromatic; taste bitter.

POWDERED GELSEMIUM.

*No. 60 Powder.*—That the official drug is often adulterated with portions of the stem is very evident, but whether intentionally or carelessly I am unable to say. To distinguish the adulteration in powdeied form has been the subject of considerable work, but with very little attendant success. The root contains no bast, and hence but a glance will indicate whether the powder be of the root or not. However, the rhizome and stem both contain the bast and in almost equal quantities, so this cannot be relied upon to distinguish between the two. It seems that neither has any characteristic cell

structure that is not found in the other. The stem, when dried, is covered with a dark brown, nearly black, layer of cork, while the rhizome is of a yellowish color. If the bark is in ordinarily coarse powder and contains a considerable amount of the stem, the dark, almost black, particles are quite noticeable; but a fine powder, or a small amount of adulteration would likely fail to show these characteristics. The ordinary micro-chemical reagents produce the same effect upon both stem and rhizome.

As before stated, the different parts—stem, rhizome and roots—are being analyzed. When the analysis is completed the results will be given.

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## THE COMMERCIAL SOURCES OF LICORICE ROOT.

By H. N. Rittenhouse.

While the commercial varieties of licorice root are well known to importers of the article, the qualities, values and sources of supply are no so well known to the pharmacist as they should be, if any importance is to be attached to accurately dispensing either the root itself or its preparations.

Previous to the year 1870 the principal source from which the United States obtained its supplies was Spain. Since then the consumption in the United States has increased so much that the Spanish root has been utterly inadequate to equal the demand. Other countries have since then come into the market, and now furnish the greater part of the market requirements. These countries are Southern Russia, Asia Minor (chiefly the province of Anatolia) and Syria, and about in the order above-named as to quantity, Russia being the largest exporter and Syria the smallest. Licorice root from any of the above-named sources, when good and sound, should be acceptable to the pharmacist for his uses, but it is not always good and sound in a proper sense as found in commerce.

Spanish root is gathered so closely and skilfully sorted and packed that much of it consists of fine, immature, fibrous roots, which, while they may be called licorice root, are practically worthless as such for the purposes for which licorice root is used, and besides are 50 per cent. higher in price than the other varieties; yet prejudice and perhaps ignorance on the part of some buy-

ers still demand Spanish root and Spanish extract. The Spanish root is sweeter and with less acridity than the other varieties, and if Spanish root was what it once was in mature condition when found in the market, the preference above noted might be justified; but, as it actually is, this prejudice is based on its ancient reputation, and is now unwarranted. The close digging and limited and practically exhausted fields of Spain are the causes of this.

Turning now to Russia, with its new and almost unlimited fields, as yet but lightly worked (exports from Russia only began in 1887), we find a mature root, rich in glycyrrhizin and extractive, much better suited for commercial purposes because better and cheaper than Spanish root, the sole objection to it being in the taste, which, in addition to the usual sweetness of Spanish root, has a slight acridity, which is really not objectionable, but gives the impression of being "stronger."

Anatolian root ranks between Spanish and Russian in the quality of sweetness (or absence of bitterness). In commerce no attention is paid to the botanical varieties of licorice root, and from the root alone it is quite impossible to determine its true botanical origin, the usual designations being from the countries of growth, as Spanish, Russian, Anatolian, etc.; though all varieties, except Spanish, are often classified as "Greek root," it must be remembered, too, that all licorice root of commerce is wild root, none being cultivated.

The variety in the market known as "selected" licorice root, and put up in small bundles, was formerly selected from Spanish sources, but as demand increased and supply diminished, other varieties having the requisite straightness and thickness were mixed with the Spanish, until now "selected root" consists of root from any and all sources if of the proper quality—straight, sound—and of the requisite length and thickness.

Peeled Russian root may now be prepared in Russia. I know of no reason why it should not be, but Syria formerly prepared "peeled" root for shipment to Europe, some of which found its way into the market as "peeled Russian." Any variety might be peeled as well as Russian and be just as good. It would be a satisfaction, however, to have things called by their correct names and pay for them accordingly. Peeled "Russian root" has always commanded a good price, doubtless partly on account of the cost of

the labor of peeling and careful drying; but if so much esteemed when peeled, why is it not just as much esteemed unpeeled as Spanish or any other variety unpeeled? Besides being much cheaper and richer in glycyrrhizin and extractive, for all practical purposes it is the best. Interest always attaches to a knowledge of the true sources and varieties of drugs, and is frequently a source of profit as well to the pharmacist.

Batoum is the principal port of export for the Russian root, which is gathered along the Trans-Caucasian Railroad, running from Batoum on the Black Sea to Baku on the Caspian Sea. The port of export for Anatolia is Smyrna, while the Spanish root finds its way into commerce through the principal seaports of Spain.

## SECOND PAN-AMERICAN MEDICAL CONGRESS.

By Joseph P. Remington.

The second Pan-American Medical Congress met in the city of Mexico during the week beginning November 16, 1896. The first Congress assembled in the city of Washington, in 1893. The purpose of these triennial gatherings is mainly to foster the advancement of medical and pharmaceutical science, and to establish closer relations between members of the medical profession and correlative branches. The large number of delegates in attendance upon the first Congress surprised the friends of the movement, and, although the number in attendance upon the second Congress was not as large, it must be gratifying to the International Executive Committee to know that over five hundred members testified to their interest by their presence, many of them contributing papers upon some subject connected with the work of the Congress. As is customary in such bodies, the detailed work was referred to sections or commissions, the latter having been organized for the purpose of carrying on continuously important work and reporting at the triennial meetings of the Congress. Two commissions have been organized, which are of special interest to pharmacists, the Commission on Pan-American Pharmacopœia and the Commission on South American Flora.[1]

[1] The Commission on Pan-American Pharmacopœia is organized, with Prof. Jos. P. Remington as Chairman; that on South American Flora, Prof. H. H. Rusby, Chairman.

The sections embraced the following: General Medicine, Pathology and Therapeutics, 89 papers; General Surgery, 45 papers; Military and Naval Surgery, 4 papers; Obstetrics, Gynæcology and Abdominal Surgery, 41 papers; Anatomy and Physiology, 7 papers; Diseases of Children, 16 papers; Ophthalmology, 15 papers; Laryngology, Rhinology and Otology, 3 papers; Dermatology and Syphilography, 3 papers; General Hygiene, Demography, Marine Hygiene and Quarantine, 25 papers; Diseases of the Mind and Nervous System and Medical Jurisprudence, 17 papers; Dentistry, 6 papers; Medical Pedagogics, 7 papers. In addition to these, a large number of volunteer papers were presented. The sections met in different localities, and the discussions which took place added largely to the interest of the reading.

The general sessions of the Congress were held in the National Theatre and Chamber of Deputies. A marked feature of the work of the Congress was the extraordinary interest manifested by President Diaz, of the Republic, the members of his Cabinet, and, in fact, all of the officials of the Government. Their attentions were not only directed to extending hospitality, but public and private museums and collections were freely accessible, official statistics were furnished, and every possible facility afforded for acquiring information upon any subject. The surgeons were given every opportunity to visit hospitals and chemists, botanists, mineralogists, archæologists, paleontologists, geologists and students in any of the related sciences were furnished with special guides to the valuable collections. The public and private social entertainments were on a scale of magnificence rarely approached. The subjects of permanent interest to pharmacists centre in the permanent commissions. These will be charged with the duty of investigating the Western Continent, especially the unknown South American plants, and the formulation of a plan for a Pan-American Pharmacopœia. This will not supersede the special Pharmacopæias of each country, but will collect the valuable features of each and endeavor to unify the strength of the powerful preparations, so that danger to life may be reduced to a minimum.

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The richest collection of palms in the world is said to be in the Botanic Garden at Buitenzorg, Java. It contains 300 species that are determined, 100 probably new and still undescribed, and 100 varieties of known species.—*Garden and Forest.*

# COMMERCIAL FERRUGINOUS PILLS—BLAUD'S FORMULA.

By William B. Thompson.

Manufacturers honestly vie with one another in an endeavor to produce this pill in an exact condition, and in maintaining its composition in a state that shall, in all respects, fulfil its therapeutic purpose or intention. Every price schedule issued lists this pill, and the quantities prescribed, sold and used exceed, perhaps, that of any other single kind except quinine.

Physicians generally believe that a constitutional effect of the iron is more promptly assured by a continued use of the Blaud composition than by that of any other form—not excepting liquid—and satisfactory results must assuredly follow where the use and popularity continue to so great an extent. Yet, if we start with the theoretical principle, and also consider the chemical action which occurs in the formation of this pill mass, that action being instantaneous, when an alkaline carbonate is brought into contact with the ferrous sulphate, and then reflect upon the sensitive and chemically unstable character of the ferrous salt formed, with its inevitable tendency towards a ferrous oxide, and finally ferric oxide, we can scarcely understand in what manner art assumes to control or retard a chemical law, postponing an action which is ultimately, if not speedily, as sure as that which governs the planetary systems. Yet it is attempted; pervious and impervious coatings are used, as means to protect the iron-salt from the oxidizing influence of air and moisture. A physical examination, and the application of a color-test to these various products of the manufactories, reveal so many conditions and appearances as to bewilder the judgment when claims to chemical accuracy are made.

The result of the first contact of the iron and the alkali in the presence of moisture is to produce a compound having a brownish green color, that of a more positive green hue being accepted as a more true product of this reaction. Then if this is accepted as the proper color indication of the true state or condition in which this ferrous salt should be presented to the human economy as a remedy, what shall we say in regard to those variable conditions as to color which the numerous commercial pills present? Shall we adopt all these as affording the proper result of a definite chemical

reaction which the originator of the Blaud pill designed? Or shall we admit that varying states of oxidation do not seriously militate against the therapeutical efficacy of this iron salt, especially when it has merged into the ferric state. In the numerous essays which have appeared upon the subject of Blaud's pills are many finely wrought theories in regard to the action of the normal fluids of the stomach, most notably the supposed free hydrochloric acid, which is fancifully conceived to be in waiting in that wondrous receptacle, ready to claim first seizure upon any congenial substance which may be ingested—with a predilection for a ferrous salt of iron—and that an insignificant amount of ferric oxide, now and then, will be but a small obstacle to the action of this solvent acid.

It would appear to be more reasonable to cease indulging in any more theories as to the precise behavior of the intestinal processes towards foreign substances, particularly medicines, or to speculate upon a probably uniform action regulating animal chemistry. But rather see to it that the state of combination is exactly such as will meet the indications suggesting its use; and that if prepared in advance of requirement, how much of chemical change or alteration can occur, and yet demonstrate it a Blaud pill, or what is its precise character as commonly found in commerce, and wherein does it differ from that of extemporaneous preparation?

This paper is presented here for the purpose of eliciting discussion. Whilst much has been written, the assertions are chiefly on one side only of the question. Now let us have the other side.

PHILADELPHIA, November 30, 1896.

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## ADULTERATED JAPAN WAX.

BY CHARLES H. LAWALL.

The analytical chemist, whose duty it is to examine the various commercial products sold by a large wholesale house, encounters many instances where samples are offered for examination before purchasing which are inferior in some respects to the official standard required for the substance, or which contain some unmistakable ingredient foreign to their nature.

It frequently occurs that the description of a substance is capable of several different interpretations, or the requirements are faulty,

so that the manufacturer or dealer is forced into accepting a substance which he believes to be inferior, but the impurity of which he cannot conclusively prove.

The watchful care necessarily exercised in a large establishment, where a high standard is rigidly maintained for all goods purchased, is a distinct advantage to the retail dealer, and, indirectly, to the consumer. Only those who are actively engaged in this class of work, realize the extent to which the nefarious practice of wilful adulteration is carried on.

Adulterations, according to a standard authority upon definitions, may be of three kinds:

(1) Adulteration or admixture to suit the public taste or desire in some respect.

(2) Unintentional admixture of foreign substances, due to faulty or careless methods of manufacture.

(3) Wilful adulteration for the sake of pecuniary profit.

Adulterators of the latter class are especially to be feared, as they strive to imitate the genuine product in every respect in order to obtain the full price for an inferior product.

When a fraud of this kind is detected by a prospective purchaser, he promptly rejects the goods and usually refuses to purchase further supplies from the same source. The manufacturer of the fraudulent goods offers them, in turn, to various other purchasers of large quantities, until he succeeds in finding one who buys without examining the quality of his purchase; thus, in almost every case, the goods eventually reach the consumer, who suffers the greatest loss.

The extent to which the Japan wax of commerce is adulterated, at the present time, has never before been equalled, in the case of a single commercial article, according to the experience of the writer or that of the house with which he is connected.

Fifty-nine cases of Japan wax, containing from 205 to 225 pounds each, were examined; twenty-five of these were found to be adulterated with starchy material to the extent of from 20 to 25 per cent. This means that, in the Japan wax purchased by one house, about 1,200 pounds of starch were paid for at the price of Japan wax, which is about three times as great.

Japan wax is a vegetable product imported from Japan, where it is prepared from the berries of several species of *Rhus*. The use of

this substance has largely increased during the past few years, as (owing to its low price) it replaces beeswax in many industries. As imported, it is usually in the form of rectangular blocks or cakes, weighing several pounds each; it possesses a yellowish-white color (becoming darker after age and exposure) and a somewhat rancid odor. The characteristics, taken from recent authorities, are as follows: Specific gravity, about 0·975 to 0·980; melting point, about 54° C.; saponification number, about 222.

The fraud was detected in the latter part of October, and, since that time, besides the number of cases enumerated, several samples have been offered for purchase, identical in the character and extent of the adulteration; thus showing that the quantity in the market is by no means confined to the amount named.

In every case the wax was purchased from agents or brokers in this country, direct importations, up to the present time, being free from admixture. The quotation: "For ways that are dark and for tricks that are vain," can also be applied to individuals of Caucasian descent.

The appearance of the sophisticated product differed slightly from that of the genuine wax. The specific gravity was slightly higher, and a difference was noticed in this respect when cakes of each were compared; the adulterated wax was, in most instances, free from the peculiar network of minute cracks which usually cover the surface of a cake of pure Japan wax. Upon close examination of a freshly fractured cake, a variation or gradation in its internal structure was observed; this was due to the settling out of the starch while the wax cooled. The quickest and most effective method found for distinguishing between a pure and an impure wax is as follows: A cake is fractured and the freshly exposed surface is scraped slightly with a knife; upon the application of several drops of iodine-test solution the adulterated article turns darker, becoming deep bluish black after fifteen minutes' time. The pure wax shows no alteration whatever, nor any coloration, excepting that which is produced by the iodine solution alone.

Samples for the determination of the constants were obtained by taking sections squarely across the cake, as the presence of different proportions of starch in the upper and lower portions of a cake would produce varying results were the samples taken otherwise. The averages of the constants obtained from four samples are as

follows: specific gravity, 1·0653; melting point, 52° C.; saponification number, 173·28. From pure samples examined at the same time, the following results were obtained: specific gravity, 0·980; melting point, 54° C.; saponification number, 220·98. The amount of foreign matter indicated by the lowering of the saponification number was found upon calculation to be 21·24 per cent. The starch was estimated directly by treating a weighed sample of the wax in a flask with chloroform, which dissolves the wax, but does not take up the starch; the solution was filtered, the residue upon the filter was washed well with ether, dried at 100° C. and weighed; the percentage obtained by this method of procedure was 23·42, corresponding favorably with the amount indicated by calculation from the saponification number.

A microscopical examination was made of the starch, which showed a lack of uniformity existing in the material used in different cases. In one instance it was unmistakably identified as corn starch, but in others it was difficult to decide upon the identity of the starch.

The consumers and handlers of this article will observe that they are likely to have offered to them a product which is dear at a price even considerably below the market quotation; and, as the sophistication is so easily detected, it becomes an important duty to search out and reject every case of this fraudulent material, in order to make it impossible for the originators of the compound to find a market for their product.

305 Cherry Street, Philadelphia.

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## PETROLATUM *VS.* VASELINE.

By Louis Emanuel.

In the advertising pages of the New York *Medical Times* the manufacturers of vaseline make the following unjust attack on petrolatum:

TO THE MEDICAL PROFESSION OF THE UNITED STATES.

We consider it our duty to inform you that when you prescribe petrolatum for a patient (in accordance with the Pharmacopœia) and have the prescription filled at the nearest drug store, you are much more likely to injure than to benefit your patient and may do him serious harm. The committee in charge of the last Pharmacopœia declined to enter therein the word "Vaseline," because it was our trade-mark, and we would not agree to surrender it, and in

place thereof invented and adopted the word "Petrolatum," which was intended to represent a substance identical to our vaseline. This action has encouraged the manufacture of worthless imitations of our product, which are sold to the druggists, the vast majority of whom neither know nor care anything about their quality, and the result is a confusion of ideas amongst physicians and failure of benefit to the patient. Now it is about time that you should clearly understand:

(1) That "petrolatum" is not "vaseline," and that the formula given in the Pharmacopœia does not and will not make vaseline.

(2) That petrolatum has come to mean a worthless and often noxious petroleum product, varying in quality from axle-grease up.

(3) That vaseline is not only useful as a vehicle (as many physicians think), but that it has extraordinary value as a remedy both externally and internally, which petrolatum has not.

These reasons ought to be conclusive, to say nothing of the fairness which should prompt honorable men to recognize those who give time, brains and money to the benefit of the world, rather than to those who live by appropriating to themselves the creations of others.

It would seem at first sight that the patentee has some rights to an unlimited monopoly, which the advertisers claim in recompense for the *brains* and *money* which has been largely devoted to the *benefit of mankind.* It appears, however, that no mortal born of woman has yet been endowed with talents sufficient to enable him to render mankind any service whatsoever without having himself first profited by the labor and brains of others. For this reason patents have only a limited existence. The wisdom of this limited monopoly is clearly demonstrated when we consider that the patentee of the process for the purification of the crude residue of petroleum distillation was not the originator of the use of animal charcoal as a deodorizer and decolorizer, and, in fact, was not the first person to apply it for this particular purpose; for Flückiger's *Pharmaceutische Chemie* tells us that "in 1847 C. B. Mansfield, Cambridge, England, patented a process for decolorizing or deodorizing petroleum sediment by means of animal charcoal; in 1865–66 R. A. Cheseborough, of New York, U. S. A., patented a process for the purpose by the use of hot animal charcoal, and in 1872 he patented the fantastic name of vaseline."

EVOLUTION OF VASELINE.

Patent No. 49,502, dated August 22, 1865, to R. A. Cheseborough, for the use of bone-black for purifying petroleum or coal oils by filtration.

Patent No. 56,179, dated July 10, 1866, to same, for heating bone-black by dry steam or otherwise, previous to using the same for filtering hydrocarbon oils.

Patent No. 127,568, dated June 4, 1872, to same, for the name vaseline.

In the latter, the claim made by the patentee is as follows:

I have invented a new and useful product from petroleum, which I have named *Vaseline*, and I do hereby declare that the following is a full, clear and exact description thereof, which will enable those skilled in the art to make and use the same.

The substance from which vaseline is made is the residuum of petroleum left in the still after the greater part of the petroleum has been distilled off. Vaseline is the product of the filtration of the said residuum through bone-black, and varies in color as it comes from the filter. First it is pure white at the beginning of the operation, soon changing to a light straw, and then a deep claret at the close of the operation.

Vaseline is a thick, oily, pasty substance, is semi-solid in appearance, unobjectionable in odor, becomes liquid at temperature varying from 85° to 110° F. It will not saponify, does not crystallize, and does not contain paraffine.

Vaseline is especially useful in currying, stuffing and oiling all kinds of leather. It is also a good lubricator, and may be used to great advantage on all kinds of machinery. It is also an excellent substance for glycerine-cream for chapped hands.

When we compare the above with the description of petrolatum of the U. S. P., we must come to the conclusion that the pharmacopœial committee is grossly misrepresented, and that pharmacy is unjustly charged with piracy.

The Pharmacopœia says of petrolatum:

A mixture of hydrocarbons, chiefly of the marsh-gas series, obtained by distilling off the lighter and more volatile portions from petroleum, and purifying the residue when it has the desired melting point. A fat-like mass of about the consistency of an ointment, varying from white to yellowish, or yellow, more or less fluorescent when yellow, especially after being melted, transparent in thin layers, completely amorphous, and without odor and taste, or giving off, when heated, a faint odor of petroleum.

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An unusually large fasciated stem of meadow thistle (Cnicus altissimus, Willd.) was sent to the museum of Purdue University a short time ago from northern Indiana. When dry, it measured 12 inches broad at the top and 3 inches at the base. The thickness of this greatly flattened stem was normal, that is, less than one-fourth inch. It was covered evenly with normal leaves, and bore a score or more of immature flower heads sessile along the upper edge. It stood 3 feet high. The interest in it lies in the size and perfect wedge form, as fasciated stems are usually irregularly developed.—*Botanical Gazette*, November, 1896.

# MODERN SURGICAL DRESSINGS.

By F. B. Kilmer.

The surgical dressings in use at the present time by such practitioners as keep pace with the advancement of the surgical art are the products of the practical application of scientific knowledge. They are the outcome of the modifications and amplification of procedures that have been brought about in the evolution of surgical science.

Dr. Wm. Pepper states that "medicine and surgery have made more progress in the last twenty years than in the twenty centuries preceding." This statement may also be applied to the surgical dressing.

In the dawn of the present era of surgery, the teachings of Lister demanded that the dressings to be applied to a wound should be saturated with chemicals capable of killing germs "within the wound or coming from without." During this epoch antiseptics were empirically applied. A dressing that promised sure death to the microbe was in demand. In those days cloth was plastered with masses of pitch, paraffin fat and carbolic acid. The products were unclean—sticky, irritating and non-absorptive—directly the opposite to those in use at the present time. Crude as was this beginning, it contained the "living spark of truth that illuminated the mysterious darkness which for centuries hovered over wound infection." It brought blessings that "have soothed and removed untold suffering and misery—have saved millions of lives. For this gift to surgery we are indebted to Sir Joseph Lister."—*Gerster.*

During the decades that have followed the time of which we speak, the forward progress of the principles of antisepsis has been continuous.

The accurate scientific observations of bacteriology has determined the value of antiseptic substances, brought a knowledge of the nature of bacteria, their habits, their life, and shown their influence in the causation of wound infection. Such knowledge has given to the surgeon newer and better weapons than those first used in the combat against wound infection. The surgical dressing has always been to the front in the revolution and evolution of surgery. Caustic applications were early substituted for those which were mild, yet more potent. Many microbe-killers were found to be man-

killers; others were shown to be valueless. Power to absorb wound secretion and exclude infection was made an essential requirement for wound-dressing material.

Prevention became both the watchword and the keystone of surgical technique. What is termed by Gerster "the conscientious practice of thorough-going cleanliness," was found possible of attainment by the use of antiseptics—"angels of cleanliness." Chemical sterilization has been combined with mechanical cleansing. Natural agents, as well as those instituted by the operator, have been called to the aid of the surgeon. In this transition, antisepsis has not been abandoned, but has developed into its higher form—asepsis. The antiseptic dressing has not been discarded, but has become aseptic. The terms antisepsis—asepsis, are not antagonistic; the one is not the antithesis of the other. "Asepsis is an exalted degree of cleanliness."

It is reached by the surgeon through the aid of antiseptics. The antiseptic agents employed to produce the condition of asepsis may be physical—heat, chemical—carbolic acid, etc., mechanical—washing. These may be supplemented by measures which exclude all bacteria. The aim sought is a condition of freedom of septic material or micro-organisms—asepsis.

*The Fundamental Law.*—In the transition of surgical practice, which we have noted, the great guiding principle first recognized by Lister has been strengthened, viz.: "that the presence of certain kinds of bacteria is an essential condition of wound infection." From this has been evolved the fundamental law that all materials which are to come in contact with the wound must be free from pathogenic organisms. To prepare a dressing which shall fulfil the requirements of this law would, at first glance, seem to be a simple undertaking. We find, however, that the task is not so easy of accomplishment when we note that over 150 species of bacteria are classed as pathogenic (6 pyogenic); in addition to this we have nearly 300 species of organisms classed as non-pathogenic for lack of information as to their disease-producing power.[1]

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[1] Buchner has shown that many of the common saprophytes classed as non-pathogenic, when injected under the skin, cause local abscess. I have recently witnessed serious results follow an experimental inoculation of a clean wound with mould spores supposed to be harmless.

These bacteria are widely distributed.

"There is no well-defined dividing line between pathogenic and non-pathogenic bacteria."—*Sternberg.*

It would be impossible in the manipulation of dressing material to separate or remove harmless bacteria from those which may be virulent. Therefore, in its practical application the fulfillment of the law demands that surgical dressings shall be free from all forms of bacteria.

All antiseptic agents do not possess the power to destroy or kill organisms. Therefore, dressings impregnated with antiseptics will not, of necessity, meet the demand. Hence, in the preparation of surgical dressings, the law must be construed to mean that, whatever may be the material and whatever may be the methods by which it may be prepared, in order to meet the requirements of surgery, the fundamental principle governing its production must provide that it shall be free from all micro-organisms.

*The Infection of Dressings.*—The materials which enter into surgical dressings, such as absorbent cotton, gauze, wool, are those which, in themselves, reach after, absorb and hold bacterial life. Every person and every object with which the dressing may come in contact in the course of its preparation, are liable to transfer to it infection. Infection through air is a possible factor.

Micro-organisms are readily disseminated through the air by the medium of dust. The air of a crowded room is always laden with bacterial life. In hospitals, the air is infected through the discharges of patients. The air of a physician's office cannot be kept free from infected dust. The dust on the drug-store counters, tables and shelves will always furnish a luxuriant bacterial garden.

Wherever people move about, they must, of necessity, transfer soil and create dust. If they move from infected centres, as do the inmates and attendants at hospitals, the visitors to the doctor's office or the patrons of a drug store, they spread infected dust.

Dressings may also become infected through the water used in their preparation. The water used upon the dressings should always be that which is boiling or which has been thoroughly boiled.

A greater source of infection arises from contact with the person who handles the dressing in the course of its preparation. Here the clothing of the operator is a possible germ carrier ; his body is swarming with bacteria numerous in species, in uncountable num-

bers. Skin, hair and mucous membranes, even of persons who are healthy and of cleanly habits, furnish to bacteria a natural home for growth and multiplication.

In catarrhal conditions, skin disease, or wherever there is an increase of secretions, the bacteria of the body increase both in kind and in number. These sources of infection require more than ordinary attention.

Sterilization of the entire surface of the body is impossible. Yet we are confronted with the fact that the skin secretions, perspiration, dandruff from the hair, all mucous secretions, are a fruitful source of infectious particles, fatal to asepsis if by any chance they should be transferred to the dressing. To even touch an aseptic dressing with hands not disinfected, to touch with prepared hands the eyes, nose, mouth or clothing, and then touch a dressing, would mean that infection would surely follow. Such a procedure would be an unpardonable violation of surgical cleanliness, a crime against asepsis. We must further take into account that the objects within the room where dressings may be prepared, including the air, the walls, furniture, floors, the tables upon which the dressings are laid every piece of apparatus, every object of any nature that may come in contact with the dressing, may be the means of transference of germ life. If such objects happen to be of the nature of organic material or those which hold moisture, the more readily do they become carriers of infection.

The maker of surgical dressings must have in mind, therefore, the materials of which the dressings are composed, that they are in their nature absorptive of infectious particles, that all objects connected with, all surrounding conditions, are sources through which infection may be carried to dressings during their handling and manipulation.

*The Disinfection of Dressings.*—Whatever the term disinfection has been made to mean elsewhere, when applied to surgical dressings it can only mean one thing—destruction of all micro-organisms in or upon the material. This process presents many varying problems. Bacteria show widely varying powers of resistance. Agents which destroy growing forms will not affect the vitality of their spores. The conditions of life and environment are all factors which must be taken into account in the disinfection of dressings. Thus, utensils and objects with smooth surfaces are readily disinfected,

because any bacteria present will be found upon their outer surface; but when bacteria are enclosed in a rock-like mass, as they are in dried dust particles, where we find them surrounded by an almost impenetrable fortress, in dried pus, sweat, in dried secretions or flesh tissue, these organisms are protected by a varnish-like coating. Bacteria, within the fibre of cotton or wool, are enclosed within a cellulose structure. Therefore, in the disinfection of cotton, wool, silk, sponge and catgut, we find that there is presented a varying problem with each material. Chemical reaction is also a factor in disinfection that has been long overlooked. In the disinfection of dressings the nature of the materials and their behavior toward the disinfecting agent must be taken into account. Thus cotton may be disinfected in a solution of soda, but wool thus treated would be destroyed.

Wool may be disinfected in an acid solution, which, in turn, would destroy cotton. Catgut is affected by most chemicals; it is destroyed by moisture. Sponge tissue is affected by many chemicals; it is destroyed by moist heat. Oily substances are impenetrable by watery solutions.

The sole universal disinfectant is fire. It destroys the infection and the infected material. It is applicable to the disinfection of asbestos dressings, which have recently been recommended for surgical purposes. There is no one method or agent which, under all circumstances, will meet all conditions. Generally, more than one agent and several methods of procedure must be used together or in succession.

The writer has made a long series of investigations, having in view the possibility of disinfecting dressings with agents that would have no reaction with the material composing the dressing, that could be readily removed from the dressing, or, when allowed to remain within the dressing material, would have no effect upon wound tissue. In these experiments, such agents as electricity, gases, vapors, friction and pressure were employed.

The general method pursued was to infect fibres with a nutrient fluid containing bacteria, to then subject the infected fibres to the action of the disinfecting agent. The results may be briefly summarized.

Electricity was not effective upon the organisms, except when electrolysis took place, as was the case when water or a solution

of salts was the medium used in the transmission of electrical energy.

Oxygen gas when under pressure had a germicidal effect, especially so when the bacteria were in a moist state. Nascent oxygen was found to be a powerful germicide. Ozone gave similar results, as did oxygen. Carbon dioxide was found to be an inhibitant, but not a germicide. The gaseous oxides of nitrogen, except $N_2O$ were found to be powerful in their action upon bacteria, but destructive to dressing material and productive of great irritation upon inhalation. Sulphur dioxide was found to be germicidal in the presence of moisture, but inapplicable to many classes of the materials used in surgical dressings. Chlorine gas is a disinfectant, especially in its reactions which takes place in the bleaching process, namely, union with hydrogen, and consequent liberation of oxygen.

The bleaching process, therefore, effectually destroys germ life. Iodine and bromine are energetic agents in the presence of moisture, but they react destructively with materials used in surgical dressings. Formaldehyde vapors possess a high power as a germicide. The vapors are highly irritating and destructive to flesh tissue. They are, however, applicable in the disinfection of some classes of material used in dressings, and are utilized in the processes hereinafter outlined.

During the mechanical process of carding cotton and other fibres, the fibres are subjected to prolonged friction, with consequent heat and electrical action. The results upon infected fibre passed through the process were interesting, and the process was found to be one of sterilization.

Experiments numbering many hundreds of series were made to ascertain the value of pressure as a sterilizing agent upon dressing materials. The results show that infected fibres may be sterilized by a pressure of 50 to 100 tons to the square inch. This process has been utilized in the sterilization of certain forms of surgical dressings.

With the discovery of a new species of bacteria there is said to be a new chemical born for its destruction.

But in the present day practice of surgery, only in a few instances, may we use chemical germicides for the disinfection of dressings and allow the chemical to remain in the finished pro-

duct. The active chemical disinfectants are for the most part destructive to dressing fabrics as well as irritating to flesh tissue. Out of the many disinfectants lauded in days past for the impregnation of surgical dressings, but few remain. It has been found that dressings, even when impregnated with antiseptics, may still harbor germ life. In the presence of dry iodoform, dry corrosive sublimate, boric acid, germs will retain their vitality for a great length of time.

Though seemingly a contradiction of terms, it is, nevertheless, a truth born of experience to state that antiseptic dressings may be the means of conveying infection to a wound. Hence, the requirement that antiseptic dressings shall be free from micro-organisms.

In the list of agents applicable to the disinfection of dressing materials, heat ranks first in germ-destroying power. Heated air is precluded for use with cotton and some of the other substances used, for the reason that the temperature required for efficiency is destructive to the material. Heated air is quite inferior in disinfecting power to boiling water and steam. Boiling water almost instantly destroys most forms of germ-life; resistant forms succumb to its action in a few minutes.

Steam, then, holds the first place as a practical agent for the disinfection of surgical dressings. To be effective, it must be saturated (unmixed with air). Saturated or streaming steam circulating under moderate pressure reaches the efficiency and gives the results attained in boiling.

*Practical Application.*—Having passed in review some of the principles which underlie the preparation of surgical dressings, fitted to fulfil the requirements of surgery, we can best gain an impression as to their practical application by a brief review of the methods instituted by the author, which are now in working operation in the laboratories of Johnson & Johnson, at New Brunswick, N. J.

The buildings set apart for this work were built for this special purpose—made plain and tight to exclude dirt. They are admirably situated away from busy and dusty streets. For miles on either side stretches river and meadow-land, securing an almost dustless atmosphere. In fitting up the rooms in which the manipulations take place, the ideas kept in view were the exclusion of bacteria, easiness of keeping clean.

The walls and ceilings are glass-smooth. The floors are filled and

polished. There are no closets or shelving, no cracks or crevices to harbor dust or dirt. The furniture consists of glass-topped tables with iron frame, allowing effectual and easy cleansing. The principal part of the work is done in the "aseptic room," so called because all things within it are at all times kept surgically clean.

The following is an extract from the rules governing this room:

"Everything outside of this room, everybody and everything passing into this room from the outside are to be regarded as infected until subjected to special cleansing operations.

"Everything required for use in this room, or being brought in, must be sterilized according to the prescribed rules.

"All cleaning, sweeping and dusting must be done at the close of the day's work. Tools, apparatus, towels, aprons, aseptible clothing, etc., are to be sterilized in the sterilizing chambers. The floor must be well moistened before sweeping; dusting must be done with damp cloths. After sweeping and dusting, the covers upon the tables must remain for at least eight hours.

"As often as may be necessary, the entire wood and iron work of the room must be washed with soap and water, then with antiseptic solutions; the room closed and fumigated with sulphur and steam."

Everything, whatsoever may be its nature or history outside of this room, is considered as infected (though, in fact, it may be free from germ life); it is, therefore, disinfected before being taken into the room. The entrance to this room is through an ante-room, which is a disinfecting station of the highest type. Through this quarantine all persons and things pass before entering the aseptic room. The persons who operate in this room are under charge of graduate surgical nurses.

The following extracts from the rules in force show the methods adopted for securing personal cleanliness:

"Every person before entering the aseptic room must put on the prescribed washable garments (flowers, ornaments, jewelry, etc., must be removed). They must thoroughly wash and scrub their hands, forearms and face according to the prescribed rules.

"*Hand Disinfection.*—(1) Scrub hands, face and forearms in a solution of ammonia and soap with a disinfected brush. By the aid of a knife or nail-cleaner, scrape all particles under the nails and on the margins.

"(2) Wash again in ammonia and soap solution, then rinse in clean hot water and dry on a sterilized towel."

After this preliminary washing, operatives must pass at once into the aseptic room. Persons engaged in directly handling dressings must further put on sterilized over-dresses, caps, sleeves, etc., and again wash their hands with soap and ammonia, rinse them in clean

water without drying, rinse in a solution of oxalic acid, finally in soda and alcohol without drying. After this washing, only such objects as have been cleansed and sterilized must be handled unless the hands are rewashed. If for any reason there is cause to leave the room, the sterilized garments must be taken off, and then, before re-entering, both the preliminary and final washing be again performed. Tracing the history of a yard of gauze on its way through these rooms, its course would be somewhat as follows: It is first rendered absorbent and bleached (in an adjoining department) and arrives at the ante-room to be made into dressings. The jars in which it will be packed, with their tops, fastenings, etc., are brought to the same point from a bath in hot soda solution. If the gauze is to be impregnated with antiseptics, it is done in this outer or ante-room. The gauze, the containers, labels and all things pertaining thereto next pass into the sterilizing chamber. This chamber forms a part of the dividing wall between the ante-room and the aseptic room. The chamber is rectangular in form, large enough to hold a wagon-load of goods. It is constructed with thick walls made of metal, asbestos and other non-conducting material. The interior is lined with steam-pipe radiators for producing heated air within the chamber. Doors to the chamber open at both ends, one into the ante-room and the other into the aseptic room. These doors are steam-tight and held in place by ratchet screws.

The chambers are fitted with steam supply and escape connections, gauges for pressure and vacuum, safety valves, exhaust valves, etc. Cars of iron with trays carry the articles to be treated. Supply pipes controlled by valves admit live steam to the interior of the chamber. The actions involved in the operations within the chamber are:

(*a*) Preliminary warming of the materials to prevent condensation.

(*b*) Removal of air.

(*c*) Circulation of saturated steam unmixed with air under pressure through every fibre of the material, subjecting them to the highest possible action of this agent.

(*d*) Subsequent exhaustion of steam and substitution of heated air.

After the gauze passes into this chamber, the doors are closed and it then becomes a hot-air chamber. The air is then exhausted

to a vacuum of 10 or 12 pounds; saturated streaming steam is then let in; the temperature soon rises to possibly 240° F., and the pressure gauge indicates 5 or 10 pounds. The steam pipes are now closed; the vacuum pump is again started until the proper vacuum is obtained.

Again steam is turned on, and so on, in turn, currents of saturated steam follow each other through the vacuum for from one to two hours. Every part of the chamber is penetrated, every fibre is subjected to the action of this highest of bactericides. The most resistant form of germ life must be reached and destroyed. From the sterilizing chamber the gauze passes directly into the aseptic room. In this room, all persons, tables and apparatus having been previously prepared, the dressings are cut, folded and packed in the jars, the covers laid on loosely.

(A large portion of this work is done by apparatus, to avoid touching with the hands.)

This work is rapidly performed, and the filled jars returned to the sterilizing chambers for a re-sterilization. This final sterilization effectually secures absolute safety against the remote possibility of infection by handling. After this final sterilization the jar seals are locked. For dressings packed in jars, this process is one of hermetic sealing, a partial vacuum having been formed within the jars during their heating and cooling. The finished dressings now pass on to be labelled, put in cartoons and made ready for shipment.

These same chambers are utilized for disinfection with formaldehyde vapors, the process being: first heating of the chambers, exhaustion of the air, filling the chamber with formaldehyde vapors, which penetrate every portion of the material; finally, exhaustion of the formaldehyde vapors, which are in turn replaced with heated air.

*Sterilization Tests.*—The effectiveness of sterilization procedures can be readily confirmed.

In the writer's laboratory the practice is substantially as follows: A portion of the dressing material (for example, a piece of gauze) is impregnated with an infected nutrient fluid. The thus infected material is then dried in air, that the organisms may, as far as possible, be placed in a resistant condition. As a check experiment, a portion of this infected and dried material is placed in sterilized nutrient jelly in the culture chamber. This is done to ascertain whether the test material has surely been infected. The remaining

portion of the infected material is then passed through the sterilization process, care being taken that it passes through like conditions as would the sterilized dressings.

In the case of gauze or cotton, the writer's practice is to wrap the test material in the centre of the package.

In testing catgut ligatures, the ligatures are moistened and untwisted; the infected material is then rolled up within the tissue and dried. After the infected material has passed through the sterilization processes, it is placed in nutrient media in a culture chamber. After a suitable time (at least three days) if a growth is found in the check experiment, we are certain that our test material was infected. If no growth has taken place in the infected material, that has passed through the sterilization processes, we are certain that sterilization has been complete in all the dressings. This conclusion needs no verification. The dressings have been prepared and sterilized by methods which exclude contamination. If a certain portion of material purposely infected, in passing through the sterilization process with them, is rendered sterile, it is conclusive proof that the whole of the dressings cannot fail to be sterile and aseptic.

The above method of procedure applies particularly to dressings containing no chemical antiseptic. Where the dressings are so impregnated, the process is varied as follows:

To avoid the restraining influence of the antiseptic upon the growth of the test organism, portions of the infected material, after passing through the sterilization processes, are placed in quite a large body of liquid nutrient media, which is shaken to dilute the antiseptic below its normal antiseptic potency; to carry this dilution still farther, a few drops from the first dilution are passed on to a second tube of culture media.

It has been found in the use of antiseptics that enough may adhere to the organism (especially to spores) to restrain development, though not destroying their vitality. This is obviated even in the use of strong solutions of an antiseptic by the dilution above mentioned.

In testing with antiseptics the test material is kept under a cultivation for at least a week. Development is often so retarded by the antiseptic tending to make hasty conclusions erroneous. In these tests with antiseptics, liquefied flesh—peptone—gelatine of Koch is usually employed.

Where no antiseptic has been employed, sterilized potatoes and other solid media have been found convenient.

The required test is the presence or absence of a growth which will liquefy solid media or produce form, color or odor characteristic of bacterial colonies.

This is verified when deemed necessary by a microscopical examination. In surgical bacteriology, the bacillus of anthrax is used as the standard test organism; whatever will destroy the vitality of this bacillus will destroy all the known organisms of wound infection.

*Who Should Make Surgical Dressings.*—In the past, dressing materials were largely the product of domestic industry and convict labor. We could not now tolerate supplies from such disease-breeding sources. In recent discussions by surgical authorities, the question has been raised as to the relative fitness of the surgeon, the pharmacist and the manufacturer as makers and purveyors of surgical materials.

The apostle of modern surgery manufactured "Lister's Gauze" in his own kitchen. Sir Joseph's kitchen is doubtless a more fitting place for such work than is the office of many of his followers. Doctors' offices are not, as a rule, the most wholesome spots. Their upholstered furniture is in constant contact with the clothing and persons of patients carrying infections of every name and kind. Their tapestried carpets are filled with dust brought from pest-laden households. In the doctor's office we will find that tables, shelves, books and apparatus are spattered with debris from urinal examinations, pus from foul sores, dried excretions from diseased skin, pathological tissue, clotted blood and dried discharges from innumerable sources.

Streams of infectious matter continually pour into the rooms of the busy doctor and find a lodging-place in its paraphernalia. The unfitness of such surroundings for the production of surgically clean dressings is evident.

I claim for the American physician the highest of honors. I all but reverence the skill and genius of the American surgeon; but before I would attempt to prepare aseptic dressings in their offices, I should, in most cases, require that they be first cleansed and disinfected upon the lines adopted by health authorities for the purification of infected premises.

A certain hospital claims that its operating room is "the cleanest

place in the world." All hospitals have not earned such a title. Many of them are attached to medical colleges where students and professors gather fresh from the dispensary clinic, from visits to infected houses, from dissecting rooms, from hundreds of sources of contagion.

Clinging to their persons and clothing may be found particles rich in pyogenic and pathogenic bacteria. In hospitals, the aggregation of infectious organisms cannot be avoided. Formerly, they were "hot-beds of infection." Now dangers are excluded only by the most rigorous procedures.

When dressings are prepared by the pharmacist, the work is generally performed in the drug store back room. This place comes far short of the conditions known as surgical cleanliness. The chemically clean graduate is still unclean in the eye of the surgeon. Counters covered with vegetable and animal drugs of all kinds are not suitable places upon which to lay absorbent gauze. Street and store dust, spatterings of syrups, extracts, oils, and all manner of decoctions, create a favorable lodging- and breeding-place for organic life. These are not wanted in surgical dressings. The pharmacist, though ordinarily clean in person and habits, familiar with soap and water in the pursuit of his calling, yet he is far from aseptic. Like the physician, he is constantly in contact with infection through the person of his patrons.

The hands that dispense beef tea at the soda counter, or that bring a jar from a mouldy cellar, should not touch sterilized material without cleansing. Thus there must be a radical change of environment before the pharmacist can attain success in aseptic technique, though he may, perhaps, rightfully claim conditions and facilities that are above those of the ordinary physician.

The facilities of the manufacturer, whose whole organization is adapted to the production of surgical dressings, are certainly more perfect than those of the surgeon, to whom such work is incidental. The environment of a room from which pathogenic organisms and septic matters are entirely excluded is superior to that obtained in the hospital or in the doctor's office. The room in which no work is undertaken except the handling of aseptic material will certainly be more nearly surgically clean than one to which infection has constant access. Persons whose only calling is that of preparing surgical material, who have been schooled in the principles under-

lying the infection and disinfection of dressings, are probably more competent to handle dressings than the doctor's student or his attendants, to whom such work is of necessity relegated. In this work, as in many other instances, properly constructed apparatus is more efficient, more cleanly, more perfect, than hand work.

Further, an organization devoted exclusively to the manufacture of dressings, once having the details arranged to prepare a yard of dressing, can produce any number of yards more perfectly than if done as occasion may require, as is the rule in the hospital or in private practice.

To the manufacturer and dispensing pharmacist is due the credit of having made possible the universal application of the principles of modern surgery. They have supplied to the practitioner in the most remote regions appliances as perfect as those used in the great hospital centres. They have placed in the hands of the practitioner appliances that fulfil every requirement of the advanced art of surgery.

I hold that the preparation, selling and dispensing of medicinal and surgical supplies to the doctor, to the surgeon and to the public belong to pharmacy. Their application is the province of the practitioner of medicine and surgery, and I maintain that it will be to the betterment of surgery to receive all dressing materials from the hands of a competent pharmacist.

*Training for the Work.*—It is important that persons who are to handle surgical dressings in any capacity be familiar with the principles as well as the details of the work. They should also know why things are done as well as how to do them. The principles of surgical asepsis are applicable to the dispensing and sale of these materials. Therefore, the following epitome of a course in aseptic technique, devised for use in the writer's laboratory, may be found useful to many pharmacists.

In addition to the daily manual training under experienced persons, the operatives are required to attend stated instructions. These instructions are in the form of demonstrations of the processes, with an explanation of the principles involved. Those in attendance are given questions to be answered and experiments to perform. Text and reference books are furnished. The scheme is modeled upon the plan of a college extension course. Among the subjects are the following:

(1) The work of preparing surgical materials, its importance, its requirements.
(2) Definition and meaning of terms.
(3) Nature of the material used in dressings. (Fibres, cloth, ligatures, etc.)
(4) Preparation of materials, bleaching, rendering absorbent, etc.
(5) Kinds of dressings used in modern surgical practice.
(6) Uses to which dressings are put in surgery.
(7) Bacteria, their nature, conditions of growth, multiplication, products of their activity, with demonstrations of the means by which they may be transferred to and from persons and things.
(8) Wound infection.
(9) Infection of dressings.
(10) Disinfection—chemical agents and physical agents.
(11) Exclusion of bacteria.
(12) Sterilization.
(13) Disinfection of persons and things.
(14) Asepsis and aseptic technique in the preparation of dressings.

The entire course in my practice occupies several months—in fact, becomes a continuous course, as additional methods are constantly brought into practice.

*Surgical Dressings in Commerce.*—Dr. Gerster, in one of his addresses, condemned the use of ready-made products as sold in the drug store, on the ground that the gauge of success is purely commercial, only directed solely to profit.

Another writer affirms that the standard of such dressings is commercial in nature, the essential requisite being profit, and that they must be sold to meet competition. That in this the requirements of surgery are matters of indifference and generally matters of ignorance.

These statements were corroborated in a recent instance by a druggist in one of our large cities, who is commercially wise. He stated that to him quality, kind or make was no factor. Low prices were the sole criterion of value. Responsibility hovers over every field of the pharmacist's activity in dispensing dressings; we share the burden with the surgeon. Whoever has stood beside the surgeon in his operating room and realized how much depended on not only the hand, the training and the skill of the operator, but the absolute cleanliness in every movement, must realize that there are some things that cannot be expressed in a money ratio.

At such a time and in such a place the integrity of the dressing rises to supreme importance. Any neglect in its preparation, any misstep through the ignorance, cupidity and stupidity of any who

have had to do in its history, is sure to be revealed. The issue of life or death in such a case should not be subject to the market rates per pound or yard. What results must follow the very common practice of dispensers who open packages of dressings, measure and weigh them over dusty counters with unclean hands, and send them on their mission? It would be more humane, perhaps, to send a lethal dose of strychnine. In the light of asepsis, to dispense morphine for quinine becomes a virtue when compared with the wilful contamination of a surgical dressing.

Poisons are put under lock and key, dispensed under rigid systems of precaution and checking.

The importance of the surgical dressing, the nature of its requirements, call for equal care. There is no article in the druggist's stock which should receive greater care and judgment. Upon every yard of gauze, sponge or ligature he dispenses hangs, perhaps, the life and death of a patient and the reputation of a surgeon. They should be guarded from every channel of direct or indirect infection.

A closet or a room, or a case should be provided for their reception that is cleanable; it should be cleaned often and kept clean. They should be sold within the containers in which they are packed in their preparation. They should never be broken open for sale or for any other purpose. They should be delivered to the surgeon so perfect that there can be no question as to their integrity, placing all the responsibility for their subsequent care in his hands. In dispensing to the public, every purchaser should be cautioned as to their nature and instructed in their handling and use. The price should meet the cost of the dressing plus a profit which will cover this service of advice, trouble and care.

Ninety-five per cent. of the 100,000 physicians in our land who apply these principles of surgery must look to the pharmacist for their dressing materials. In filling this demand, the pharmacist should supply such materials as will meet the highest surgical requirements. As far as the dressing is a factor, the surgeon at the country cross-roads, by the aid of the pharmacist, should be enabled to reach the advanced methods of the metropolitan clinic.

To attain this end in the making, in the buying, in the sale and in the dispensing, even to the most minute detail, there is required knowledge, skill, ability and finally a faithful application of the same.

# CHEMICAL ANALYSIS OF THE BARK OF HONEY LOCUST, GLEDITSCHIA TRIACANTHOS.

BY LOUIS P. CARSTENS, PH.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 160.

The specimen analyzed was obtained in central Pennsylvania. The results of the analysis were as follows:

| | Per Cent. |
|---|---|
| *Petroleum Ether Extract:* | |
| Fat, wax, etc. | 1·38 |
| *Ether Extract:* | |
| Resin, 1·15 per cent.; organic acid, etc. | 1·17 |
| *Absolute Alcohol Extract:* | |
| Resin, 0·97 per cent.; alkaloid, etc. | 1·62 |
| *Water Extract:* | |
| Glucose, 0·63 per cent.; saccharose, 0·57 per cent.; mucilage, 2·08 per cent.; dextrin, 1·92 per cent.; etc. | 6·51 |
| *Alkaline Water Extract:* | |
| Pectin and albuminoids, 4·84 per cent.; etc. | 13·68 |
| *Acidulated Water Extract:* | |
| Pararabin, etc. | 3·62 |
| Lignin | 11·76 |
| Cellulose | 42·42 |
| Moisture | 5·10 |
| Ash | 7·00 |
| Loss and undetermined | 5·74 |
| Total | 100·00 |

The ash contained potassium, calcium, aluminum and ferric iron, as chlorides, sulphates, carbonates and phosphates.

Starch, tannin and glucosides were not present.

To obtain more of the organic acid and the alkaloid, which were indicated in the proximate analysis, for further examination, about 500 grammes of the ground bark were percolated with 95 per cent. alcohol. After reducing the percolate to a small bulk by distillation, it was diluted with about five times its bulk of distilled water, distinctly acidified with hydrochloric acid, and the mixture filtered. After agitating the filtrate with chloroform, it was made alkaline

with sodium hydrate and again agitated with this solvent. The chloroformic layers were allowed to evaporate spontaneously. The residues were dissolved in alcohol, but failed to crystallize on spontaneous evaporation. The test solutions for alkaloids were then applied to the residue from the chloroform shaken with the alkaline solution, with the following results:

Potassium tri-iodide, no precipitate.
Mayer's solution, precipitate.
Gold chloride, precipitate.
Phospho-tungstic acid, precipitate.
Picric acid, precipitate.
Platinic chloride, precipitate.
Tannic acid, no precipitate.

Two and one-half kilogrammes of the bark, when operated on in the manner described above, furnished a larger quantity of this principle. The residue obtained upon evaporating the chloroform was dissolved in absolute alcohol, and the solution filtered through animal charcoal. The filtrate yielded crystals of the principle when allowed to evaporate spontaneously. The following reagents were applied to these crystals on a porcelain surface:

Sulphuric acid, dark-red color.
Sulphuric and nitric acids, brownish-red color.
Sulphuric acid and potassium bichromate, dark-brown color.
Nitric acid, brownish-red color.
Gold chloride, brown color.

When the crystals were heated with soda-lime, ammonia was evolved.

The substance, removed from the acid filtrate by shaking it with chloroform, was dissolved in absolute alcohol, but failed to crystallize on spontaneous evaporation. Dissolved in water it gave precipitates with the following reagents for organic acids:

Lead acetate, yellow precipitate.
Silver nitrate, dark precipitate.
Ferric chloride, black precipitate.
Potassium bichromate, brown precipitate.
Gold chloride, black precipitate.

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France finds her Algerian cork oaks a convenient and satisfactory source of direct revenue. According to a recent official bulletin, the department of Algiers contains 65,000 acres of cork trees in the hands of the Government.—*The Forester.*

# ALCOHOL AS A SOURCE OF ERROR IN THE TITRATION OF ALKALOIDS AND ALKALOIDAL RESIDUES.

By Chas. Caspari, Jr.

In August last, the writer presented a paper on the above subject at the Montreal meeting of the American Pharmaceutical Association, but not content with the results detailed therein, decided, upon his return home, to investigate the matter more fully with the view of presenting a second paper on the same subject at the next annual meeting. Such a paper has been made unnecessary by the publication of an article, written by Mr. L. F. Kebler, in the December, 1896, issue of the American Journal of Pharmacy, wherein is demonstrated the fact that *strictly pure* alcohol does not interfere appreciably with the titration of acids by alkalies in the presence of color indicators, except in the case of methyl orange and a few others. Having carried out a series of titrations with *strictly pure* alcohol prepared by himself, using hæmatoxylin, Brazil wood and cochineal as indicators, the writer desires herewith to corroborate the statements made by Mr. Kebler, that satisfactory results can be obtained with *such* alcohol quite as well as with water.

The writer, in his paper (see American Journal of Pharmacy, September, 1896, p. 473), called attention to the fact that alcohol and absolute alcohol, as available in the market, exercise a decided influence on color indicators and may prove the fruitful source of error in volumetric work, the statement being supported by a large number of tabulated results obtained in actual work. This was probably the first time that attention had been publicly called to this matter, and inquiry made at the time of several leading pharmacists and chemists failed to elicit any information or experimental data. The absolute alcohol used in the writer's experiments last summer and stated to have a slight alkaline reaction was of E. R. Squibb & Sons' manufacture, and taken from a fresh bottle. That the error liable to occur from the use of commercial alcohol will be greater or less in proportion to the impurities present in the alcohol is, of course, true, and the question arises: Has *strictly pure* alcohol always been used in volumetric work, and have analysts been in the habit of preparing it specially for such work, the market (at least to the writer's knowledge) not providing the article? The chairman of the Committee on Indi-

cators of the American Pharmaceutical Association, Mr. Kebler, in his instructions to the committee last winter, directed the use of alcohol, but failed to note his experience of eighteen months ago (see AMERICAN JOURNAL OF PHARMACY, 1896, p. 667), nor did he caution the members against the use of commercial alcohol. Did he assume that all would use *strictly pure* alcohol, and did he use *such* alcohol in his own work done for the committee? This fact should have been noted in the committee's report.

The explanation offered in the writer's paper for the peculiar behavior of alcohol, on the basis of electrolytic dissociation, was made on the assumption that high-grade commercial alcohol, known as cologne spirit, could scarcely be so impure as to account for the great disturbance observed, especially as the alcohol employed corresponded quite well with pharmacopœial requirements, and since Ostwald has directed attention to the action of alcohol on color indicators. Even now, when using strictly pure alcohol, the writer has observed that in a mixture of only alcohol and indicator a *much larger* (two to four fold) quantity of alkali solution is required for the characteristic reaction than in a mixture of only distilled water and indicator; moreover, the same peculiar behavior towards tropæolin was observed as recorded in the writer's paper, for 50 c.c. strictly pure alcohol with 3 drops of a very sensitive tropæolin solution failed to show a decided acid reaction after addition of 4·5 c.c. $\frac{N}{10}$ $H_2SO_4$. This latter circumstance, while confirming the unfitness of tropæolin as an indicator for *alcoholic* titrations, requires further investigation.

While the writer regrets his misapprehension of the causes leading to the observations mentioned in his paper of last August, and although the conclusions then arrived at have now been shown to be partly erroneous, both by experiments in his own hands and by the recently published reports of Mr. Kebler, one good result has at least been obtained, namely, to show the wholly unreliable character of commercial alcohol for volumetric work and to direct the attention of pharmacists and others prominently to this fact, and to the necessity for purifying all alcohol intended for such work.

BALTIMORE, December 17, 1896.

# A RÉSUMÉ OF RECURRENT TOPICS.

By William B. Thompson.

*The Avoirdupois of Odors.*—The ingenious are never idle. There need be but few lost moments to the industrious mind. The power, volume, weight of odors can be relatively compared, it is claimed, by the amount of organic matter obtainable by reducing this to condensation and solution. Dense and heavy odors must assail the nerve filaments in our nasal organ with a ponderosity greater than those of a lighter or more ethereal kind. Experiments may be made by thoroughly impregnating the warmed and dried air of a closet or compartment with a chosen odor. Something is certainly diffused when our sense detects. What is it to be thus appreciable? Is it organic matter? This being granted, it must have weight. After a prolonged diffusion of the odor in the air of the closet or room, it is suddenly filled with the vapor of water, and finally cooled, when the condensate is collected. This is to be examined for amount of organic matter, and comparisons instituted. The actual utility of this does not appear except in the light of scientific interest; ordinary tests are all physical. We may, however, desire to know whether the volume of natural odor in the plant species can be intensified by natural means. The power and diffusiveness of fragrance must have a basis of considerable materiality to be so permanent and enduring. Does it exist there as we recognize it, or is it not rather the result of the subtle chemistry in which the oxygen plays the most important part?

*Eucaine.*—This new therapeutic, similar to cocaine, is a laboratory, not a vegetable, product. Sixty-seven letters are required to constitute its correct scientific orthography. An abbreviated prescription for such an article will not be criticized for ambiguity. The derivation of eucaine would seem to invest it with an antiseptic character. Its solubility in aqueous media is very free. It does not present that tendency to fermentative change or to decomposition as many vegetable alkaloids in solution are prone to do. Some observations have been made as to the comparative toxic effect with cocaine, eucaine being less, and its onset and intensity less. The pharmaceutical preparations will include an ointment, but its chief uses will be those of a mydriatic, and as an anæsthetic (10 per cent. solution) in minor dental surgery. Its composition is said to

be very complex, and its preparation difficult. The pharmacology of eucaine, however, is well worthy of attention.

*Resemblance with Difference.*—The realm of nature abounds in curious creations, and a fanciful imagination can help many comparisons. But with all these freaks, or, to be more reverent, designs, these objects would almost seem to present the appearance of art assisting nature. For instance, the fly-orchis, Ophrys muscifera, and the bee-orchis, Ophrys apifera, produce flowers, the parts of which bear a very close resemblance to the body forms of these insects respectively. Then we have, in the mandrake and the ginseng, forms which require very slight additions to parts to complete the figure of human shape. The poetic fancy has given us a tradition that the ploughman stood aghast as his blade threw upon the surface the rooted mandrake with its human feet and hands! Minerals are often observed to possess outlines of figures which might be mistaken for exquisite chiseling.

*Professional Compensation.*—There seems to exist a somewhat fixed law of compensation in almost all affairs except those of human agency, and even there, if we look carefully into the subject, will be found causes for which we ourselves are directly responsible. We honor the individual who honors himself; we respect the man who gives evidence of an innate self-respect, especially in a professional character. That man who degrades the value of a prescription down to that point of a commercial bartering standard creates a torment which will return to plague him all the remaining days of his business life. There should be no autocratic rates on prescriptions; but there should be a just and fair compensation when all the elements of expense are duly considered. Some estimates have been given as to what should be a fair basis of calculation in attaching the value, commercially and scientifically, to a physician's prescription. The value to the patient may be incalculable; but this is never computed. A curative compound is of inestimable worth to illness, suffering and pain. And when the compounder is justly rewarded for his knowledge, skill and science, what a twopenny comparison is the cost of the remedy to the man's or woman's health, strength and enjoyment of life! This is the way in which the public should be educated to view it. In the meanwhile, let no reputable pharmacist consent to gauge the value of a presented prescription by the price to which some mercenary competitor, some commercial

apothecary, whose existence is made possible by our loose, lax laws, has degraded it and himself. The value of the service in compounding a prescription, omitting the cost of material, bears the just ratio of 50 per cent. of the *price charged*, yet what a dignified recompense on a *ten-cent* prescription!

*Fruits and Juices.*—Those who are in the habit of observing may often wonder why tropical fruits are so much less perishable than those grown in temperate regions. The first impression is that the high degrees of heat and the strong, direct light would both conduce to relaxed tissue and vapid juice; yet exactly the reverse of this is true. The provision which guards against this, and so wisely adjusts the productions to the clime, is seen in the structure of the orange and the lemon. The volatile oil and fixed oils, which exist in the pellicle of the rind, absorb and check the penetrative power of the heat, whilst the soft, white substance, the inner pulpy coating, is as good a barrier against both cold and heat as the fur on an animal's body or the soft down on the bird's breast. As the result of this the orange species, when uninjured in the picking and handling, can be carried, without deteriorating, to great distances and to all varieties of climate.

How very different is the case with our Northern berries and fruits! But few of these, if any, will keep their flavor for forty-eight hours, and none of them retain their form for any considerable duration of time. Another curious and striking fact is that the juices of tropical fruits are all of a cool temperature in the native or natural state, being shielded from vicissitudes. The milky juice of the cocoanut is of an even temperature, refreshingly cool, being well protected in that dermic *coire*, or skin, which is between the outer shell and the meat of the fruit. Then again, our now indigenous watermelon gets an abundance of sweet juice and retains it, no matter how dry and arid may be the soil of its habitat, the largest—and much the finest—variety of these fruits being grown in the Indian Desert, between the valley of the Indus and the Ganges, where not a drop of water falls from the clouds during the annual cycle, and the rainy monsoon often passes over the region without shedding one sympathetic tear of moisture upon the parched soil; yet the melon secures its quota of sweet, watery juice, and keeps it, under its varnished rind, comparatively cool. Verily, before the magic of Nature, the feats of art and legerdemain are insignificant!

# CINCHONA CULTIVATION IN BENGAL.[1]

The Thirty-fourth Annual Report of the Cinchona Plantations of the Government of India in British Sikkim and Bhutan has lately been submitted to the Bengal Government by Dr. George King, C.I.E., F.R.S, Superintendent of the Royal Botanic Garden, Calcutta, and of cinchona cultivation in Bengal, and Government quinologist.

The number of trees uprooted for their bark during the year 1895–96 was 453,000, comprising 65,000 of C. succirubra, used for the manufacture of "Government Cinchona Febrifuge," and 388,000 of the kinds which yield yellow or quinine-producing bark chiefly hybrid cinchona and Calisaya ledgeriana, a large proportion of the trees uprooted being small. The number of plants was increased during the year by 9,200 hybrids ; the total census of living cinchona plants at the close of the year, including nursery stock, was 3,807,701.

The crop collected during the year amounted to 467,190 pounds of dry bark, consisting of 53,380 pounds of red and 413,810 pounds of yellow bark. The whole of this crop, with the exception of 790¼ pounds supplied to the Government Medical Stores Department or sold to Government institutions, was made over to the cinchona factory for manufacture into quinine and febrifuge. In addition to the bark cropped at the Government plantations, 170,000 pounds of quinine-yielding bark was purchased from private cultivators in the district. Seventy-four thousand pounds of red bark, worked up in the factory during the year, yielded 3,124 pounds of cinchona febrifuge, valued at Rs. 10 (about 12s.) per pound, and from 387,200 pounds of yellow bark, 9,004 pounds of quinine sulphate, valued at Rs. 14 (about 16s.) per pound, were manufactured. An additional 1,500 pounds of quinine were purchased from the quinine factory of the Madras Government at Ootacamund, in order to meet the greatly increased demand for the 5-grain packets, which are issued to the people at all post-offices throughout the province, at the rate of 1 pice each (less than a farthing).

The total issue of quinine for the year amounted to 10,287 pounds, an increase of 2,725 pounds on the previous year, 1,145 pounds of this increase being due to the growth of the post-office

[1] *Pharmaceutical Journal*, October 17, 1896.

demand for pice-packets, and 937 pounds issued on account of the Chitral expedition. Of cinchona febrifuge there were issued during the year 3,830 pounds, 554 pounds more than in the previous year, the amount purchased by the public having increased by 194 pounds, showing that the preparation is held in high estimation by the public as a cheap and reliable remedy for fever, notwithstanding that cinchonidine and cinchonine can be purchased at a cheaper rate in the Calcutta bazaar. The febrifuge is an unbleached quinetum, and represents the total alkaloids in the bark.

The net profit on the year's operations amounted to Rs. 4,598, a sum which Dr. King says would form but a small dividend on the capital which has been sunk in these plantations since they were first begun. There has not been for many years, however, any capital to pay interest upon, as the cost of the plantations was extinguished long ago by profits made during the early years of the manufacture of cinchona febrifuge. As the Government of India desires only to secure for the people, without loss to itself, a cheap remedy for fever, the Lieutenant-Governor of Bengal considers this result entirely satisfactory. The demand for quinine in the popular 5-grain powders has increased with such rapidity that it has been found necessary to limit the sale to post-offices in Bengal and Assam, and to discontinue the regular supply to other provinces.

The acknowledgments of Government are again accorded to Dr. King and to Mr. G. Gammie, the Deputy Superintendent, for their efficient management of the department during the year.

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## RECENT LITERATURE RELATING TO PHARMACY.

### IODINE MANUFACTURE IN JAPAN. (*Chemist and Druggist, October 24, 609.*)

It is well known that enormous quantities of seaweed containing iodine are gathered along the coasts of Japan, and were it not for the fact that the manufacture of iodine from kelp is scarcely profitable in view of the competition of the Chilian product, Japan would no doubt be one of the principal iodine-producing countries. In fact, even under the present circumstances, Japanese iodine and iodides find a market locally, and have even been seen in Europe in commercial quantities. A proposal has now been made

to the Japanese Government by certain native chemists that the customs duty on iodine and iodides in Japan should be increased to such an extent as to enable the Japanese industry to be self-supporting.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

BARIUM PLATINO CYANIDE.

The text-book way of preparing barium platino cyanide is to pass gaseous hydrocyanic acid through a mixture of platinous chloride 2 parts and barium carbonate 3 parts, suspending in twice their weight of water. Schertel, in a recent issue of *Berichte*, describes a safer process, viz.: Platinum chloride is precipitated by hydrogen sulphide at 60° to 70° C., and the well-washed platinum sulphide is dissolved in a warm solution of potassium cyanide. On evaporation, the potassium platino cyanide ($K_2PtCy_43H_2O$) crystallizes out, and equal parts of potassium sulphide and potassium thiocyanate remain in the mother-liquor. If a solution of barium cyanide be used, the barium platino cyanide is obtained, and from this, by double decomposition with uranium sulphate, the platino cyanide of uranium may be gotten in beautiful crystals.—*The Chemist and Druggist, October 31, 1896.*

PRODUCTION OF QUICKSILVER IN CALIFORNIA.

*The Engineering and Mining Journal* (New York) states that quicksilver production in California has shown this year a considerable increase, the total receipts at San Francisco for the six months ending with June having been 18,439 flasks, a gain of 4,743 flasks, or 34·6 per cent., over the first half of 1895, and of 6,033 flasks, or 48·7 per cent., over 1894. While these receipts gauge the rate of production very fairly, they do not give the whole amount, as the reports do not include the quicksilver sold directly from the mines, nor that shipped from them to the East by rail, which does not come to San Francisco at all.

The larger output seems to have been absorbed without difficulty. In addition to the greater demand from the California mines, there has been a growth in exports very nearly corresponding to that in the production. The trade with China, which had been suspended for several years, has been renewed, and has aided materially in disposing of the increased production.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

## MAPLE SUGAR.

*The Production of Maple Sugar*, G. H. Grimm (*Cult. and Country Gent.*, 61 (1896), No. 2247, p. 146).—The author urges the necessity of absolute cleanliness in everything connected with the process; the sap should come in contact with tin only; tin spouts should be used; and the buckets should be covered. The sap should be evaporated as soon as possible after it leaves the tree. With suitable apparatus a barrel of sap can be converted into a gallon of syrup weighing 11 pounds in 20 minutes. This syrup will make 8 pounds of sugar. The natural color of the syrup is a translucent white; if it weighs less than 11 pounds per gallon it will ferment; if more, it will crystallize. The syrup is far superior to that from remelted sugar.

In putting it up for the market it should be poured into tin cans at 83° C., and hermetically sealed. It will keep better in an attic than in a cellar, unless the cellar is very dry.

## GOLD AND SILVER IN SEA WATER.

Gold and silver in sea-water may not be plentiful enough to warrant the formation of limited companies to extract them, yet those metals exist in the ocean in appreciable amounts. Professor A. Liversidge, in a long paper read before the Royal Society of New South Wales (*vide Chemical News,* Sept. 18, *et seq.*), gives the results of some experiments made with the object of determining the amount of precious metal in the sea-water off the coast of New South Wales. The evidence obtained indicated the presence of gold in the proportion of about 0·5 to 1 grain per ton, or in round numbers from 130 to 260 tons of gold per cubic mile. Assuming that the cubic contents of the whole of the ocean equal 400,000,000 cubic miles, the above proportion would be equivalent to a total amount of 100,000,000,000 tons of gold. With regard to silver, Malaguti obtained 0 0005 gm. from 50 litres of sea-water, representing more than 40 tons per cubic mile. The metal sheathings of vessels have been proved to remove both gold and silver from sea-water, that from one old trader yielding silver, 4 ozs. 15 dwts. 9·2 grs., and gold, 1 dwt. 2·4 grs. per ton, together with a good deal of iodine. Muntz metal sheathings from the piles of wharves have also yielded considerable proportions of both gold and silver.—*Pharmaceutical Journal, October 17, 1896.*

# EDITORIAL.

The sixty-eighth volume of the AMERICAN JOURNAL OF PHARMACY, which closed with the December number, contained 708 pages of reading matter and index, and was the largest volume of this journal ever issued. It is but justice to our contributors to say that we believe the quality of the reading matter has never been excelled in previous volumes. Many of the papers called for illustrations, and the call was liberally answered by the publishing committee, so that every number contained one or more illustrated papers.

The present issue opens the sixty-ninth volume with an array of original matter, which we have no hesitation in designating as highly meritorious. Mr. Maiden's paper on red gum is one of the first published in this country on that subject. Mr. Rittenhouse's contribution on the present sources of licorice root contains information derived from first hands; and Mr. LaWall's article calling attention to a new and easily detected sophistication of Japan wax is of the greatest importance. It is no detraction from the other papers that they are not mentioned here, yet we cannot refrain from especially calling attention to the address by Mr. Kilmer on modern surgical dressings, in which the pharmacist will find information about the dispensing of these commodities which should cause him to redouble his vigilance in the direction of cleanliness, and encourage him to insist on the physician ordering such quantities as to enable the dressings to be dispensed without danger of their becoming infected.

## THE PATENT MEDICINE ALMANAC.

This is the season of the year when the pharmacist is liberally supplied with almanacs, bearing his own business card, for distribution to his customers. Many fall into the trap, and pass these wretched advertisements on to their customers, and thereby commit a grievous error which injures them in a number of ways.

If every pharmacist who reads this JOURNAL would either return the almanacs to the sender or consign them to the fire, it would, in some sections of the country at least, break up this system of making him the advertising agent of the nostrum manufacturers.

## EXIT LUCIUM.

Some three months ago, a new element was announced in monazite sand. It was soon found, however, that the enterprising discoverer had patented it, and proposed to use it in incandescent gas lighting.

Dr. William Crookes, editor of the *Chemical News*, has been supplied with the nitrate and oxalate of the alleged element by the patentee, Mr. P. Barrière, and finds, by spectroscopic and chemical examinations, "that lucium is nothing but impure yttrium."

In the same issue of the *Chemical News*, Dr. R. Fresenius calls attention to the fact that his name had been used in connection with the so-called element without authority.

# REVIEWS AND BIBLIOGRAPHICAL NOTICES.

INORGANIC CHEMICAL PREPARATIONS. By Frank Hall Thorp, Ph.D., Instructor in Industrial Chemistry in the Massachusetts Institute of Technology. Boston: Ginn & Co., publishers.

We have several excellent small manuals in the English language for the manufacture of organic preparations, such as those of Cohen and Fischer, but this is the first one covering the ground of inorganic chemistry in the same way. It has, moreover, several new and distinctive features which we think are of value. After stating the formula and molecular weight of each compound, it gives the materials and quantities of the same needed for the preparation, and full working directions for the carrying out of the manufacture, followed by the reactions involved and the properties of the product. Under the latter head, the author gives, in a large number of cases, tables showing the solubility of the salt in water at different temperatures, and the specific gravity of solutions of different strengths. For these tables the authorities are invariably given. While the book wants a table of contents, the substances are alphabetically arranged and an index follows.

A valuable introductory chapter on solution, precipitation, filtration, decantation, washing, evaporation and crystallization, abounding in valuable suggestions, has not been overlooked. S. P. S.

THE PRINCIPLES OF THEORETICAL CHEMISTRY, with special reference to the constitution of chemical compounds. By Ira Remsen, Professor of Chemistry in the Johns Hopkins University. Fifth Edition. Lea Brothers & Co., Philadelphia and New York. 1897.

It has been the aim of the author, in the latest edition of this valuable work, to bring it in accord with all the recent advances of chemical science. The salient features of this book are, that it contains a clear statement of theoretical chemistry in a moderate space. It is therefore not so formidable to the beginner as several of the larger works on this subject, yet it contains abundant information to equip the student for almost any amount of research work.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO. (Fritzsche Brothers.) Leipzig and New York: October, 1896.

ON CERTAIN DERIVATIVES OF TRICHLORDINITROBENZOL. By C. Loring Jackson and W. R. Lamar. Reprint from *American Chemical Journal*, October, 1896.

A GUIDE TO THE ORGANIC DRUGS OF THE U. S. PHARMACOPŒIA. By John S. Wright. First Revision, Twelfth Thousand. Indianapolis: Eli Lilly & Co. 1896.

CHEMISTS' AND DRUGGISTS' DIARY for 1897.

BRITISH AND COLONIAL DRUGGISTS' DIARY for 1897.

FOURTH AND FIFTH ANNUAL REPORTS OF THE CALIFORNIA STATE BOARD OF PHARMACY, 1894–96.

# MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, December 16, 1896.

The regular pharmaceutical meeting of the series of 1896–97 was held in the Museum of the College. Mr. J. W. England presided. The minutes of the previous meeting were allowed to stand as published.

Mr. F. B. Kilmer, of the firm of Johnson & Johnson, of New Brunswick, N. J., was the first speaker on the programme, and addressed the meeting on the subject of "Modern Surgical Dressings." (See page 24.) This address was not only interesting from the technical standpoint, but embodied many valuable suggestions of a practical character. The speaker said that the period marked by the introduction of Sir Joseph Lister's principles of antisepsis was a distinct epoch in the history of surgery. The wound dressings made at the beginning of this epoch were characterized as crude in contrast with those manufactured at the present time. Formerly they were caustic, irritating and non-absorptive, while to-day the essential requirements are power to absorb wound secretion and to exclude infection. The author stated that observations of bacteriological life had determined the value of antiseptic agents, and an interesting feature of his address was his description of the various methods and agents used for making sterilized dressings at the present time. Accompanying the address were samples of present-day surgical dressings, and, by way of comparison, one of gauze cloth that was made in 1887. The speaker said that this sample was the type of the first antiseptic dressing; that in making it cloth was impregnated with wax, rosin and carbolic acid; and that, in the light of present knowledge, it was as antiquated as though it were a thousand years old. Microscopic slides of bacilli and tubes containing cultures of the harmless kinds were also exhibited.

Prof. Joseph P. Remington delivered an address on the "Second Pan-American Medical Congress," which was held in the city of Mexico during the week beginning November 16, 1896. (See page 15.) The speaker defined the purposes of the Congress and gave a concise statement of the work that was accomplished at the recent meeting. The Congress was held under the auspices of the Mexican Government, and all of the entertainments and social features connected therewith were on a magnificent scale. An invitation to hold the next meeting in Caracas, Venezuela, in 1899, was received from the Venezuelan Government, and was accepted. The speaker also related some other incidents of his trip, which were both entertaining and instructive. One thing in particular he spoke of, and that was the harmonious relations existing between this country and Mexico. He believed that more could be done by scientists in strengthening and promoting these relations than by diplomats or politicians.

"Spermaceti" was the subject of a paper presented by Mr. Lyman F. Kebler. About a year ago the author made a chemical examination of a large number of samples of spermaceti, but as a question was raised as to their genuineness, he determined to procure, if possible, samples which would fulfil this requirement. These were accordingly procured, and the results obtained with them agreed in every particular, except that of specific gravity, with those obtained with the previous samples. In the former work but one method was employed for determining the specific gravity, and in the latter several methods

were applied, the figures varying with the method used. The paper was accompanied by specimens, and was the occasion for considerable discussion.

"Murray Red Gum, *Eucalyptus rostrata*, and Its Kino," was the subject of a communication by Mr. J. H. Maiden, Government Botanist at Sydney, New South Wales. (See page 1.) This paper is not only a valuable one from the botanical standpoint, but is of interest as bearing on the commercial and medicinal products of the Australian colonies. In connection with this subject attention was called to the following samples: Syrupus eucalypti rostrati, made from the kino, and recommended as a valuable astringent remedy; Eucalyptus red gum, and samples of oil of several species of eucalyptus. These were sent by Mr. J. Bosisto, of Richmond, Melbourne, who is an honorary member of this College.

Mr. Wm. B. Thompson contributed a paper entitled, "Ferruginous Pills (*Blaud's Pills*)." (See page 17.) The writer suggested examinations of the commercial and extemporaneous preparations for the purpose of ascertaining the precise character of the former, and of determining wherein it differed from the latter. He doubted whether ferrous carbonate was superior in medicinal efficacy to the other compounds of iron formed by the oxidation of this constituent. He thought it was time to stop theorizing, and offered these suggestions for the purpose of stimulating investigation along this line.

"The Commercial Sources of Licorice Root" was the subject of a paper by Mr. H. N. Rittenhouse. (See page 13.) This paper was a concise statement of the sources of commercial licorice root, together with the qualities of the various kinds, and was mainly intended to aid the retail pharmacist in making purchases of the article.

Mr. Chas. H. LaWall contributed the last paper, which was on "Adulterated Japan Wax." (See page 18.) The facts presented by the author were timely, in that they showed to what extent fraud may be perpetrated, and in warning buyers against the efforts of the purveyors of the article to obtain a market for their product. Samples of both the pure and the adulterated Japan wax were shown.

On motion of Professor Trimble, a unanimous vote of thanks was tendered Mr. Kilmer for his interesting address and accompanying specimens.

On motion, the meeting adjourned.

T. S. Wiegand,
*Registrar.*

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The tenth volume of Professor Sargent's *Silva of North America* was published on the 28th of November. It contains figures and descriptions of the arborescent species of Yucca, which grow north of the Mexican boundary, the Arborescent Palms of the United States, the Cupressineæ and Taxaceæ, and the following genera of Coniferæ: Juniperus, Cupressus (including Chamæcyparis), Thuya, Libocedrus, Sequoia and Taxodium. Two additional volumes will complete the work. The eleventh, now in course of preparation, will be devoted entirely to the genus Pinus, and in the twelfth and final volume will be described the Spruces, Firs, Hemlocks, Larches and a few trees of earlier orders which have been found since the publication of this work was begun. —*Garden and Forest.*

# CLASSES

—OF THE—

# PHILADELPHIA COLLEGE OF PHARMACY,

SEVENTY-SIXTH ANNUAL SESSION, 1896-1897.

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## FIRST YEAR CLASS LIST.

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Allen, Milton Deronda, | Medford, | N. J. | D. W. Flemming. |
| Andrews, Willard Crandall, | Cortland, | O. | |
| Anstock, Arthur David, | Mahanoy City, | Pa. | L. Oliphant. |
| Arnott, William, | Wilmington, | Del. | Jos. P. Williams. |
| Aughinbaugh, John Keely, | Greenvillage, | Pa. | Eberly Bros. |
| Bachman, Herbert Keck, | S. Bethlehem, | Pa. | Luther Gerhard. |
| Ball, Clifford Arthur, | Hellertown, | Pa. | Elwood Ball. |
| Balliet, Howard Paul, | Allentown, | Pa. | John P. Frey. |
| Bamford, Melvin William, | Reading, | Pa. | R. P. Wilkinson. |
| Barker, Laura Alice, | Coalport, | Pa. | Dr. Woods. |
| Barker, Raymond Clark, | Philadelphia, | Pa. | Van Dyke Bros. |
| Barnett, Eldredge Ewing, | Cape May City, | N. J. | D. C. Guthrie, M.D. |
| Bayles, John Wickoff, | Mt. Holly, | N. J. | Edward B. Jones. |
| Bear, Benj. Sam'l Janney, | Mt. Joy, | Pa. | James C. Perry. |
| Beddow, Llewellyn Jenkins, | Mahanoy City, | Pa. | M. R. Stein. |
| Blankemeyer, Henry John, | Philadelphia, | Pa. | Kennedy & Burke. |
| Booth, John Henry, | Philadelphia, | Pa. | Long & Neely. |
| Bounds, Jesse Vastine, | Wortham, | Tex. | |
| Bowers, Howard Lewin, | Easton, | Pa. | H. B. Sample & Son. |
| Brown, James Lawrence, | Philadelphia, | Pa. | R. T. Marshall & Co. |
| Bulger, Walter John, | Conshohocken, | Pa. | Thos. F. McCoy. |
| Campbell, William Lester, | Mt. Pleasant | Ia. | Frank L. Kreider. |
| Chalquest, Gustave Emil, | Morristown, | N. J. | E. A. Carrell. |
| Chamberlin, William Allen, | Indianapolis, | Ind. | Frank Morse. |
| Clark, John Edward, | Lock Haven, | Pa. | Franciscus & Co. |
| Cochran, Harry Barr, | Millerstown, | Pa. | J. C. Altick & Co. |
| Cockroft, David Holiday, | Philadelphia, | Pa. | Arthur S. Hollopeter. |
| Collins, Mary O., | Atlanta, | Ga. | |
| Crain, Charles Edward, | Springfield, | O. | G. & S. Coblentz. |
| Crawford, Horace Victor, | Mifflinburg, | Pa. | G. W. Rowland. |
| Culby, Walter Gibson, | Philadelphia, | Pa. | Joseph Healy. |
| Curtis, Henry, | Minneapolis, | Minn. | O. J. Thompson, M.D. |
| Davis, Benjamin Winter, | Camden, | N. J. | Geo. L. Geiger & Co. |
| Davis, Samuel Bond, | Bridgeton, | N. J. | Reeve & Fithian. |
| Diehl, George Edward, | Charlestown, | W. Va. | Light & Watson. |
| Dixon, John Glaspey, | Salem, | N. J. | J. H. Lock, M.D. |
| Dodson, Henry Malcolm, | Delta, | Pa. | M. L. Holloway. |
| Doherty, Harry Aloysius, | Atlantic City, | N. J. | F. Elmer Post. |
| Donnelly, Clarence Eugene, | Bridgeton, | N. J. | F. Seitz, M.D. |
| Doubler, George Hogen, | Milton, | Pa. | W. H. Galbraith. |
| Dunn, Edwin Alfred, | Meadville, | Pa. | P. Henry Utech. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Egel, Frederick William, | Bound Brook, | N. J. | Chas. L. Manning. |
| Engler, Robert Saylor, | Temple, | Pa. | John B. Raser. |
| Evans, Alex. Cornelius, | Brookhaven, | Miss. | George Dejan. |
| Evans, Fannie Cheney, | Reading, | Pa. | W. C. Rowe. |
| Falkenhainer, Charles, | Guttenburg, | Ia. | James Hervey. |
| Faulhaber, Gustave Adolph, | Loudenville, | O. | Gustav Appenzeller. |
| Fenner, Harvey Albert, | S. Bethlehem, | Pa. | Campbell & Bro. |
| Finger, Philip Charles, | Lancaster, | Pa. | J. A. Brown. |
| Fishburn, Richard Levis, | Lock Haven, | Pa. | Andrew Blair. |
| Fleming, Arthur Bowles, | Chambersburg, | Pa. | J. S. Barnitz. |
| Freeman, William Joseph, | Trenton, | N. J. | M. Tidd. |
| Gasslein, Richard Joseph, | Philadelphia, | Pa. | James J. Ottinger. |
| Gillan, Charles McDowell, | Chambersburg, | Pa. | P. B. White. |
| Grady, William Patrick, | Philadelphia, | Pa. | F. W. E. Stedem. |
| Greisamer, Henry Franklin, | East Greenville, | Pa. | Emil Jungmann. |
| Gruel, John Edward, | Lancaster, | Pa. | John C. Long, dec'd. |
| Gryning, John Francis, | Philadelphia, | Pa. | Geo. B. Evans. |
| Hammond, Nathan Brown, | West Chester, | Pa. | Arthur B. Hammond. |
| Hance, Howard Ivins, | Philadelphia, | Pa. | R. A. Hance. |
| Hannum, John Lewis, | Media, | Pa. | W. E. Dickeson. |
| Harrison, Walter B., | McKeesport, | Pa. | J. C. Smith. |
| Hartman, Harry Kessler, | Pensauken, | N. J. | J. W. Kohlerman. |
| Hartman, Henry Loelke, | Lebanon, | Pa. | Dr. Geo. Ross & Co. |
| Harvey, Charles John, | Butler, | Pa. | D. H. Waller. |
| Hays, Samuel Smith, | Greensburg, | Pa. | S. Logan Waltham. |
| Heckman, John George, | Meadville, | Pa. | J. G. Lindeman. |
| Heineberg, Alfred, | Selma, | Ala. | Selma Drug Co. |
| Hess, Percy Dudley, | Syracuse, | N. Y. | J. LeRoy Webber. |
| Hesse, Frederick William, | Savannah, | Ga. | |
| Hetrick, Harry Leady, | Altoona, | Pa. | W. M. C. Craine. |
| Heyke, John Ericson, | Dayton, | O. | C. E. Martin. |
| Heyl, Charles Ambrose, | Philadelphia, | Pa. | P. M. Kelly, M.D. |
| Hicks, George Wellington, | Trenton, | N. J. | A. D. Cuskaden. |
| High, Raymond, | Norristown, | Pa. | W. M. Rickert. |
| Hill, George Price. | Lansford, | Pa. | W. M. Hill. |
| Hillan, Joseph James, | St. Clair, | Pa. | John M. Hillan. |
| Hoagland, Robert John, | Peoria, | Ill. | B. G. Clapham. |
| Hoch, Quintus, | Philadelphia, | Pa. | Aquila Hoch. |
| Holland, Albert James Fowler, | Philadelphia, | Pa. | Geo. Holland, M.D. |
| Holloway, Paul Fundenberg, | Mifflintown, | Pa. | Jos. W. England. |
| Holt, Edwin Merrimon, | Goldsboro, | N. C. | C. B. Miller. |
| Hostetter, Harry Jacob, | Reading, | Pa. | Harry Bitler. |
| Hottenstein, Peter David, | Kutztown, | Pa. | C. L. Shoemaker. |
| Humma, Osmond Bernard, | Reading, | Pa. | F. X. Wolf. |
| Hungerbuehler, John Conrad, | Philadelphia, | Pa. | |
| Hunt, Earl Robert, | Bethlehem, | Pa. | C. E. Keeler. |
| Huzzard, Kurtz, | Norristown, | Pa. | Eugene Fillman. |
| Jackson, Charles Henry, | Salem, | N. J. | Harry Lippen. |
| James, Arthur Bernstein, | Kingston, | N. Y. | J. Wohlgemuth. |
| Jenkins, David Evans, | Danville, | Pa. | Henry C. Blair. |
| Kaderly, Eugene John, | New Philadelphia, | O. | |
| Keiser, Frederick, | Milton, | Pa. | C. Carroll Meyer. |
| Kelchner, Frederick Victor, | Fleetwood, | Pa. | C. A. Eckels. |
| Kemp, Lousian Scott, | Dayton, | O. | Justus Schmitt. |
| Kimberlin, Fred. William, | Norristown, | Pa. | Chas. B. Ashton. |
| Kincaid, Raymond Keck, | Allentown, | Pa. | Harvey I. Keiper. |
| Klusmeyer, Henry Chester, | Easton, | Pa. | Fred. L. Mevus. |
| Koch, Christopher, Jr., | Philadelphia, | Pa. | C. A. Eckels. |
| Kraus, Wm. Fred. Constance, | Philadelphia, | Pa. | Otto Kraus. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Krehl, Benjamin, | Titusville, | Pa. | Theo. W. Reuting. |
| Lacy, Burdett Seldon, | Gloucester, | N. J. | Wm. E. Lee. |
| Lauer, Julius Paul, | Millersville, | Pa. | C. E. Keeler. |
| Lawton, Oliver Halton, | Philadelphia, | Pa. | Lawson C. Funk. |
| Lehman, Charles Luther, | Boiling Springs, | Pa. | R. T. Blackwood. |
| Lehman, George Theodore, | Portsmouth, | O. | Fisher & Streich. |
| Leonard, Emma, | Davisville, | Pa. | |
| Lincoln, John Hamilton, | Bowling Green, | O. | J. C. Lincoln. |
| Lingle, John McNit, | Bellefonte, | Pa. | F. Potts Green. |
| Lock, William, | Philadelphia, | Pa. | James Huston. |
| Longstreet, Chalmer Joseph, | Mexico, | N. Y. | Norval D. Hart. |
| Love, Thomas B., | Philadelphia, | Pa. | Bullock & Crenshaw. |
| Luckenbach, Harry Windfield, | Bethlehem, | Pa. | Simon Rau & Co. |
| McClure, Richard Ferris, | Wilmington, | Del. | N. B. Danforth. |
| McCollin, James Garrett, | Philadelphia, | Pa. | Wm. H. Milliken. |
| McCoy, James Edward, | New York, | N. Y. | H. G. Shinn. |
| McCullough, Ed. Leonard, | Salladasburg, | Pa. | |
| McDonnell, Joseph Francis, | Centralia, | Pa. | G. W. Davis. |
| McElwain, William Thomas, | Chambersburg, | Pa. | Charles D. Keefer. |
| McFall, John Allen, | Charleston, | S. C. | A. C. McClennan, M.D. |
| McGarrah, William Henry, | Scranton, | Pa. | F. W. E. Stedem. |
| McGuire, Thomas Edward, | Mahanoy City, | Pa. | Shenandoah Drug Store. |
| McKane, Francis Joseph, | Philadelphia, | Pa. | |
| McKeever, William Henry, | Philadelphia, | Pa. | |
| MacMurray, Annie, | Upland, | Pa. | Wm. H. Farley. |
| MacPherran, Ivan LeRoy, | Pittsburg, | Pa. | |
| Maghee, Griffith Holme, | Rawlins, | Wy. | Thos. G. Maghee, M.D. |
| Malone, Charles Edward, | Philadelphia, | Pa. | |
| Mattison, Richard Van Selous, Jr., | Ambler, | Pa. | R. V. Mattison, M.D. |
| Meister, Samuel Emil, | Lancaster, | Pa. | James F. Ross |
| Meredith, Harry Lionel, | Hagerstown, | Md. | D. C. Auginbaugh & Son. |
| Mervine, Graydon Duncan, | Milton, | Pa. | J. S. Follmer, M.D. |
| Metzger, Chas. Washington, | Abbottstown, | Pa. | A. Dalton. |
| Mitchel, Edward, | Philadelphia, | Pa. | E. R. Gatchel. |
| Mooney, Frank, | Philadelphia, | Pa. | F. Schwartz, M.D. |
| Mountain, Lloyd Lott, | Confluence, | Pa. | W. S. Mountain, M.D. |
| Moury, Joseph Daniel, | Shamokin, | Pa. | L. W. Hensyl, M.D. |
| Mutty, Walter Clement, | South Brewer, | Me. | F. W. E. Stedem. |
| Nicklas, David Edward, | Chambersburg, | Pa. | J. S. Barnitz. |
| Norris, Clarence Augustus, | Manasquan, | N. J. | Andrew Blair. |
| Orf, George Marion, | Philadelphia, | Pa. | |
| Orr, James Alexander, | Philadelphia, | Pa. | J. V. Slaughter, M.D. |
| Osterlund, Otto William, | Kinekulle, | Sweden. | Theo. Campbell. |
| Patrick, William Smith, | Salem, | N. J. | W. Henry Dunn. |
| Pechin, Edward Charles, | Philadelphia, | Pa. | G. J. Pechin. |
| Pflieger, Ellwood Keech, | York, | Pa. | Dale, Hart & Co. |
| Phillips, John Henry, | Redfield, | N. Y. | Wm. H. Phillips. |
| Pile, Wilson, | Philadelphia, | Pa. | Gustavus Pile. |
| Popp, Andrew Martin Ralph, | Reading, | Pa. | John B. Raser. |
| Potts, Samuel Lawrence, | Newtown, | Pa. | Richard W. Livezey. |
| Price, Arthur Chew, | Wilmington, | Del. | Joseph C. Roberts. |
| Pullen, Rodney Woolston, | Camden, | N. J. | J. S. Baer, M.D. |
| Radefeld, Robert, | Philadelphia, | Pa. | Fred. Radefeld. |
| Rains, Edward Lee, | Memphis, | Tenn. | Jas. S. Robinson. |
| Ranck, David Walter, | Philadelphia, | Pa. | J. W. Ranck, M.D. |
| Reice, William, | Bloomsburg, | Pa. | Jas. H. Mercer. |
| Reigel, M. Calvin, | Linglestown, | Pa. | G. B. Evans. |
| Reinhart, Robert Lucian, | Shepherdstown, | W. Va. | S. F. Loughridge. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Reynolds, Alver Carroll, | Rising Sun, | Md. | C A. Eckels. |
| Rhoads, Robert Elliott, | Reading, | Pa. | Irvin J. Brandt. |
| Rice, Albert Ainsworth, | Flemington, | N. J. | Franklin C. Burk. |
| Robbins, Edward Cruise, | Glassboro, | N. J. | F. G. Thoman. |
| Roessner, Benjamin, | Philadelphia, | Pa. | Decatur Milligan. |
| Rogers, Edward Bancroft, | Mt. Holly, | N. J. | Elmer D. Prickitt. |
| Ross, Dell Noblitt, | Rosemont, | Pa. | Frank W. Prickitt. |
| Rossell, Edward Wood, | Springfield, | N. J. | Charles B. Mathis. |
| Ryan, William Stephen, | Philadelphia, | Pa. | Albert D. Forrest. |
| Sample, James Turner, | Roaring Spring, | Pa. | C. J. Biddle. |
| Saylor, Byron Centennial, | Annville, | Pa. | Henry T. Hayhurst. |
| Schreiner, Charles Herman, | Philadelphia, | Pa. | L.W. Hildenbrand, M.D. |
| Schwaemmle, Fred. Philip, | Philadelphia, | Pa. | E. H. Fienhold. |
| Seitz, John Alphonsus, | Wilmington, | Del. | Z. James Belt. |
| Seubert, Charles Aloysius, | Lebanon, | Pa. | John F. Loehle. |
| Shannon, Samuel Coward, | Philadelphia, | Pa. | D. M. Harris. |
| Shapiro, Henry, | Vitebsk, | Russia. | F. W. E. Stedem. |
| Sheehan, William Henry, | Philadelphia, | Pa. | H. M. Campbell. |
| Shirey, Orville Ludwig, | Chambersburg, | Pa. | Cressler & Keefer. |
| Shoffner, John Perry, | Norristown, | Pa. | Harry H. Stallman. |
| Simcox, Howard Leon, | Philadelphia, | Pa. | G. W. Bowen, M.D. |
| Sipes, Clarence Lessly, | McConnellsburg, | Pa. | W. H. Perkins, M.D. |
| Skinner, Clarence Russel, | Chambersburg, | Pa. | Samuel E. Wagaman. |
| Sleifer, Jay Ward, | Philadelphia, | Pa. | J. A. Wamsley, M.D. |
| Smith, Chas. Elwood Rupert, | Philadelphia, | Pa. | Shoemaker & Busch. |
| Smith, George Carroll, | Pottstown, | Pa. | C. A. Smith. |
| Smith, Silas Alfred, | Philadelphia, | Pa. | Wm. McCorkle. |
| Smith, Wellington Gordon, | Lykens, | Pa. | A. B. Schminky. |
| Snyder, Herman Hugo, | Philad-lphia, | Pa. | Frank C. Davis. |
| Stahlé, Robert Nevin, | Gettysburg, | Pa. | Jesse W. Pechin. |
| Stancill, George Walter, | Selma, | N. C. | G. T. Williams. |
| Stang, Peter, | Philadelphia, | Pa. | Henry Mueller, M.D. |
| Steel, Chalmers Alexander, | Huntingdon, | Pa. | H. E. Steel. |
| Stern, Wilson C. A., | S. Bethlehem, | Pa. | D. B. Richards, M.D. |
| Stinson, William Samuel, | Titusville, | Pa. | Geo. B. H. Brown. |
| Stout, Philip Samuel, | Quakertown, | Pa. | Oliver Stout. |
| Strode, Richard Clark, | Philadelphia, | Pa. | Funk & Groff. |
| Suhn, Minnie, | Vitebsk, | Russia. | Marcus Peisakhovitch. |
| Tanzola, Angelo, | Philadelphia, | Pa. | Victor Michelotti. |
| Turner, Kenneth Beymer, | Washington, | D. C. | |
| Turner, Joseph Constant, | Philadelphia, | Pa. | W. F. Steinmetz. |
| Turner, James Deaver, | Baltimore, | Md. | |
| Tye, Frank John, | Gordon, | Pa. | J. E. Gregory. |
| Van Dyke, James Wilber, | Hightstown, | N. J. | H. G. Rue. |
| Van Senden, James, | Philadelphia, | Pa. | |
| Wagner, Charles, Jr., | Philadelphia, | Pa. | J. A. Fajans, M.D. |
| Waite, William Crigler, | Culpeper, | Va. | R. B. Macoy. |
| Walters, Fred. Robert, | Philadelphia, | Pa. | |
| Warrington, Henry, | Philadelphia, | Pa. | C. W. Warrington. |
| Watson, James Nathaniel, | Elizabethtown, | Pa. | Henry C. Blair. |
| Weakley, William Stair, | York, | Pa. | J. J. Weakley. |
| Wehn, Clyde Edwards, | Johnstown, | Pa. | Charles Young. |
| Wenner, Harvey Eugene, | Allentown, | Pa. | Geo. D. Feidt. |
| West, Katherine Powell, | Norristown, | Pa. | Jos. C. Roberts. |
| Wilber, John Arthur, | Malone, | N. Y. | A. A. Allen. |
| Wolf, Charles, | Philadelphia, | Pa. | S. K. Loder. |
| Wright, John Franklin, | Cañon City, | Col. | Hunter Palmer. |
| Wyckoff, Elmer Leroy, | Ithaca, | N. Y. | Fred. H. Blackmer. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Young, Annie Hawkins, | Henderson, | N. C. | Geo. B. Evans. |
| Zeller, Earl Emanuel, | Mifflinburg, | Pa. | James Kleckner. |
| Ziegler, Chester Winsor, | Gettysburg, | Pa. | Shinn & Baer. |

## SECOND YEAR CLASS LIST.—1896–97.

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Abrams, Frederick Arthur, | Philadelphia, | Pa. | John Wyeth & Bro. |
| Albert, Harry Clay, | Maysville, | Ky. | |
| Albright, Charles Henry, | Philadelphia, | Pa. | John P. Frey. |
| Anderson, George Charles, | Meadville, | Pa. | A. L. Ballinger. |
| Baer, Lemuel Miles, | Lancaster, | Pa. | Breidinger & Comber. |
| Bartholomew, Arthur, | Golden City, | Col. | J. W. Higgins. |
| Beane, George Ridenour, | Bainbridge, | Pa. | H. C. Blair. |
| Beardsley, Carolyn Frances, | Chicago, | Ill. | |
| Berberich, Herman, | Baden, | Germany. | James Moffet. |
| Berry, Robert Taylor, | Charlestown, | W. Va. | P. H. Franklin. |
| Beyerle, Charles Wellington, | Bernville, | Pa. | E. M. Boring. |
| Bishop, David Kerlin, | Mifflintown, | Pa. | W. G. Nebig. |
| Black, Robert Morris, | Philadelphia, | Pa. | P. M. Kelly, M.D. |
| Bloor, Alfred Wainright, | Manor, | Tex. | |
| Booth, Thomas, | Philadelphia, | Pa. | Alexander Wilson. |
| Brach, Cornelius, | Kerzenheim, | Germany. | W. E. Miller. |
| Bradford, Edward Burton, | Newport, | N. J. | A. LaDow. |
| Bready, William Ramsey, Jr., | Philadelphia, | Pa. | A. J. Frankelberger. |
| Brennan, Thomas Francis, | New London, | Conn. | W. Higbee Whitcomb. |
| Brewton, Swain Hoffman, | Cape May City, | N. J. | Wm. Porter. |
| Brown, Hampton Housman, | Pleasant Grove, | Pa. | B. L. Brown, M.D. |
| Buckingham, Harry Sheldon, | Clayton, | N. J. | H. G. Shinn. |
| Calloway, Harry Willis, | Baltimore, | Md. | H. Browning. |
| Cassel, Oscar Heebner, | Norristown, | Pa. | William Stahler. |
| Cohen, John Thomas, | Chester, | Pa. | R. H. Henderson. |
| Coleman, John Edward, | Carbondale, | Pa. | Geo. V. Eddy. |
| Cooper, Walter Greenlee, | Savannah, | Mo. | J. P. Cooper. |
| Cox, Linwood, | Norristown, | Pa. | Atwood Yeakle. |
| Cunningham, Orrick Sim, | Clear Spring, | Md. | George W Hurd. |
| Dale, David, | Philadelphia, | Pa. | John Wyeth & Bro. |
| Davis, George Eckley, | Eckley, | Pa. | Charles J. Schneider. |
| DeBeust, William Hare, | Philadelphia, | Pa. | R. H. DeBeust, M.D. |
| Decker, William Robert, | York, | Pa. | R. Wm. Ziegler. |
| DeHaven, Ida Valeria, | Bayonne, | N. J. | |
| Dirmitt, Charles Walter, | Philadelphia, | Pa. | C. H. Dirmitt, M.D. |
| Downing, William Henry, | Wilmington, | Del. | N. B. Danforth. |
| Dubell, Alexander, | Mt. Holly, | N. J. | R. C. Barrington. |
| Eason, David Clark, | Brookville, | Pa. | Shinn & Baer. |
| Estlack, Walter Forrest, | Philadelphia, | Pa. | H. W. Estlack. |
| Evans, Abner Thomas, | Greensburg, | Pa. | S. P. Brown. |
| Evans, Samuel, Jr., | Circleville, | O. | Evans & Kimmel. |
| Farrow, Frederick Reeves, | Philadelphia, | Pa. | Eberly Bros. |
| Felty, Harvey Long, | Palmyra, | Pa. | A. C. Hersh. |
| Fisher, Samuel Keim, | Lititz, | Pa. | J. C. Brobst, M.D. |
| Fleming, John Halbert, | Media, | Pa. | A. W. Smedley, dec'd. |
| Foltz, Edgar Daniel Grant, | Bethlehem, | Pa. | N. B. Danforth. |
| Friebely, Harry Eugene, | S. Bethlehem, | Pa. | H. A Burkhart, M.D. |
| Funk, Robert Rowland, | Hagerstown, | Md. | Blew & Lucas. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Gage, Porcius Silkman, | Vineland, | N. J. | |
| Geiger, Edward George, | Peoria, | Ill. | F. H. Vonachen. |
| Gibb, Andrew, | Lock Haven, | Pa. | W. C. Franciscus. |
| Gladhill, James White, | Jersey Shore, | Pa. | George M. Beringer. |
| Greer, Mary C., | Philadelphia, | Pa. | E. H. Richardson, M.D. |
| Groff, Harry Musselman, | Lancaster, | Pa. | C. W. Warrington. |
| Groff, William, | Quarryville, | Pa. | T. M. Rohrer, M.D. |
| Grunden, Percival Edward, | Steelton, | Pa. | G. A. Gorgas. |
| Guth, Herbert Wallace, | Allentown, | Pa. | Peters & Smith. |
| Haus, Ralph Leonard, | Mifflinburg, | Pa. | W. H. F. Vandegrift. |
| Heintzelman, Joseph August, | Philadelphia, | Pa. | Jos. A. Heintzelman. |
| Helmbold, Anna Palmer, | Philadelphia, | Pa. | F. W. E. Stedem. |
| Heverly, Frederick Chase, | Wilkes-Barre, | Pa. | R. D. Williams. |
| Hoffman, William Anthony, | Renovo, | Pa. | E. T. Swain. |
| Hubbert, William Ernest, | Hico, | Texas. | W. E. Hubbert. |
| Hudson, Harry, Jr., | Philadelphia, | Pa. | Wm. C. Walter. |
| Hukill, Oscar K., | Hot Springs, | Ark. | Andrew Blair. |
| Huntington, Joseph, | Philadelphia, | Pa. | J. C. Perry. |
| Jenkins, Frank Huston, | Hanover, | Pa. | J. L. Emlet. |
| Joffe, Jacob Leopold, | Kovno, | Russia. | E. J. Lupin. |
| Kain, John Kauffman, | York, | Pa. | J. B. Kain, M.D. |
| Keen, George Carll, | Vineland, | N. J. | J. J. Ottinger. |
| Keen, Geo. Samuel Jacob, | Wiconisco, | Pa. | C. D. Christman, M.D. |
| Keenan, John Joseph, | Philadelphia, | Pa. | J. J. Burk. |
| Keim, Joseph Paxson, | Bristol, | Pa. | Emlen Martin. |
| Kepner, Weldon Stover, | Shippensburg, | Pa. | J. C. Altick & Co. |
| King, James David, | Easton, | Pa. | Rowland Willard. |
| Kintzer, Harry Augustus, | Womelsdorf, | Pa. | F. T. Landis. |
| Kirby, Frank Brennand, | Philadelphia, | Pa. | Lawson C. Funk. |
| Kohl, George Michner, Jr., | Jenkintown, | Pa. | Thos C. Coltman. |
| Krewson, William Egbert, Jr., | Philadelphia, | Pa. | Wm. E. Krewson. |
| Kyser, George Herbert, | Richmond, | Ala. | G. W. Kyser. |
| Latchford, Orwan Luther, | Markelsville, | Pa. | D. H. Ross. |
| Lee, Walter Evan, | Vineland, | N. J. | Bidwell & Co. |
| Lefever, John Matthew, | York, | Pa. | S. M. Gable. |
| Lerch, William Abraham, | Allentown, | Pa. | Peters & Smith. |
| Levy, Joseph Jacob, | Philadelphia, | Pa. | J. H. B. Amick, M.D. |
| Lindig, Charles Warren, | Lewisburg, | Pa. | H. N. Hoffman. |
| Luebert, August Gustav, | Philadelphia, | Pa. | David A. Over. |
| McCleary, Harry Walter, | Carlisle, | Pa. | J. E. Sipe. |
| Mahoney, J. Norris, | Bridgeport, | Pa. | E. A. Stahler. |
| Mathers, Grace, | Philadelphia, | Pa. | Susan Hayhurst, M.D. |
| Metzler, Walter Scott, | Baltic, | O. | A. S. Metzler, M.D. |
| Middleton, Claude Ruoff, | Philadelphia, | Pa. | Shinn & Baer. |
| Miller, William Frederick, | Erie, | Pa. | Wm. Fischer. |
| Mills, John Leopold, | Cardington, | O. | A. C. Schofield. |
| Monaghan, Thomas Francis, | Philadelphia, | Pa. | H. D. Stichter, M.D. |
| Monroe, William Robeson, | Fresno, | Cal. | G. H. Monroe. |
| Morell, Charles Joseph, | Philadelphia, | Pa. | Chas. M. Morell. |
| Morgan, Frank William, | Pass Christian, | Miss. | Wm. Greve. |
| Mountain, Lloyd Lott, | Confluence, | Pa. | W. S. Mountain, M.D. |
| Ney, Howard Jacob, | Harrisburg, | Pa. | Chas. F. Kramer. |
| Obear, Josiah Julian, | Winnsboro, | S. C. | O. Y. Owings. |
| Otto, Glenn Frazier, | La Crosse, | Wis. | Oscar Houck. |
| Page, George Ralph, | Scranton, | Pa. | Horatio M. Cole. |
| Parse, Andrew Connet, | Flemington, | N. J. | J. Sherman Cooley. |
| Perse, James Woodlock, | Plymouth, | Pa. | J. V. Perse. |
| Pettebone, Thomas J., | Dorranceton, | Pa. | C. W. Spayd, M.D. |
| Preston, Gilbert Kent, | Philadelphia, | Pa. | David Preston. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Putt, Milton Thomas, | Lebanon, | Pa. | W. B. Means. |
| Raker, John Wilson | Pillow, | Pa. | Chas. H. Tatem. |
| Randolph, Edward Fitts, | Plainfield, | N. J. | L. W. Randolph. |
| Richardson, James, | Pickering, | Ont. | Geo. Y. Wood. |
| Ringer, Lewis Johnson, | Hagerstown, | Md. | M. L. Byers & Co. |
| Rinker, Henry Paul, | Hellertown, | Pa. | C. W. Albright. |
| Ritz, Charles August, | Ashland, | Pa. | A. Schoenenberger. |
| Roberts, DeWilton Smith, | Norristown, | Pa. | O. F. Lenhardt. |
| Rose, Frank, | Philadelphia, | Pa. | G. W. Bowen. |
| Ross, Annie Catherine, | Philadelphia, | Pa. | W. E. Supplee. |
| Sausser, Howard Elmer, | Schuylkill Haven, | Pa. | John B. Raser. |
| Schlauch, Theodore Storb, | New Holland, | Pa. | C. J. Seltzer. |
| Scott, Emma Love, | Richmond, | Va. | Susan Hayhurst, M.D. |
| Seiberling, Joseph Dallas, | Hynemansville, | Pa. | Frank Morse. |
| Sheitz, Lloyd A., | York, | Pa. | Harry A. Hay. |
| Shemp, Russell Nicholas, | Philadelphia, | Pa. | W. E. Supplee & Bro. |
| Shwab, George Augustus, | Nashville, | Tenn. | |
| Sieber, Isaac Grafton, | Harrisburg, | Pa. | J. Wilson Hoffa. |
| Slobodkin, Rose, | Minsk, | Russia. | Susan Hayhurst, M.D. |
| Smith, Alfred Homer, | Smyrna, | Del. | Wm. F. Dunn. |
| Smith, Benjamin James, | Trenton, | N. J. | Aquila Hoch |
| Snavely, Clarence Osborne, | Lebanon, | Pa. | Wm. G. Shugar. |
| Snyder, John Paul, | Lancaster, | Pa. | W. T. Hock. |
| Steinmetz, William Baer, | Ephrata, | Pa. | G. S. Royer. |
| Stimus, Howard George, | Moorestown, | N. J. | G. H. Wilkinson. |
| Stokien, Francis Joseph, | Charleston, | S. C. | R. P. Wilkinson. |
| Stott, Horatio Allen, | Coatesville, | Pa. | W. S. Young. |
| Strawinski, Jacob Franklin, | York, | Pa. | Dale, Hart & Co. |
| Swartley, Harry Mahlon, | Philadelphia, | Pa. | F. P. Streeper. |
| Thomas, Frank Hartwell, | Valdosta, | Ga. | |
| Thompson, Henry Kirk, | Titusville, | Pa. | R. C. Cadmus. |
| Thompson, Harry Merril, | Selins Grove, | Pa. | T. C. Tomlinson. |
| Tomlinson, George Walton, | Rydal, | Pa. | S. T. Hamberg. |
| Troth, Ernest Augustine, | Palmyra, | N. J. | Shoemaker & Busch. |
| Tyler, William Walston, | Onancock, | Va. | George B. Evans. |
| Underwood, James Harris, | Woodbury, | N. J. | W. S. Reeve. |
| Waldner, Herman Theodore, | Ashland, | Pa. | T. H. Strouse. |
| Walter, William Bell, | Gettysburg, | Pa. | H. C. Blair. |
| Wilt, Geo. Washington, Jr., | Flemingsburg, | Ky. | John J. Reynolds. |
| Winkler, Oscar Charles, | Philadelphia, | Pa | Milton S. Apple. |
| Winslow, John Hayes, | Vineland, | N. J. | A. C. Taylor. |
| Wiza, Joseph Louis, | Philadelphia, | Pa. | A. A. Poehner. |
| Zane, William Spence, | Seabright, | N. J. | G. B. Minton. |
| Zimmerman, Thos. Edmonds, | Carlisle, | Pa. | B. F. Emrick. |

## SENIOR CLASS LIST.—1896-97.

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Althouse, Harry B., | Harrisburg, | Pa. | F. J. Althouse. |
| Anderson, Ralph, | Latrobe, | Pa. | R. T. Blackwood. |
| Baker, Newton Claire, | Sunbury, | Pa. | Charles Leedom. |
| Barth, Charles, | Philadelphia, | Pa. | W G. Nebig. |
| Bartholomew, Claude Lafayette, | Bath, | Pa. | Peters & Smith. |
| Bates, John Phillips, | Mansfield, | Pa. | J. M. Smith. |
| Becht, Frederick, | Philadelphia, | Pa. | Bullock & Crenshaw. |
| Beh, Edward, | Philadelphia, | Pa. | David J. Reese. |

| *Name.* | *Place.* | *State.* | *Preceptor.* |
|---|---|---|---|
| Breithaupt, Alphons Peter, | Philadelphia, | Pa. | George H. Ochse. |
| Brown, Roscoe James, | Oxford, | Pa. | W. T. J. Brown. |
| Brueckmann, Walter, | Philadelphia, | Pa. | E. W. Herrmann. |
| Brumbaugh, Albert Sylvester, | Mansfield, | O. | Silas Shull. |
| Carson, James Thompson, | Philadelphia, | Pa. | Dr. Meredith. |
| Clapp, Samuel Clarence, Jr., | Milton, | Pa. | C. E. Stout. |
| Clark, Edward B., | Reading, | Pa. | F. X. Wolf. |
| Clark, Robert Hall, | Union City, | Ind. | J. P. Frey. |
| Cloud, Norman Henderson, | West Chester, | Pa. | Luther Gerhard. |
| Codori, Simon Jacob, Jr., | Gettysburg, | Pa. | J. M. Hillan. |
| Compton, Richard Hal, | Allen, | Tex. | Geo. F. McKinstry. |
| Cooper, Morris, | Friedensburg, | Pa. | G. D. Borton. |
| Cope, Edward Kreidler, | Philadelphia, | Pa. | F. H. Cope. |
| Cornell Horace Hogeland, | Newtown, | Pa. | Robert Glenk. |
| Craig, Ralph Butz, | Allentown, | Pa. | Kennedy & Burke. |
| Criswell, Edward Ott, | Waynesboro, | Pa. | J. W. Harrigan. |
| Deibert, William Henry, | Northampton, | Pa. | J. H. Stermer. |
| Eckels, Frank Huston, | Carlisle, | Pa. | J. B. Moore. |
| Eddy, Volora Doolittle, | S. Chester, | Pa. | A. L. Castle. |
| Entwistle, Albert Henry, | Philadelphia, | Pa. | Chas. H. Roberts. |
| Eschbach, Clarence Derbie, | Milton, | Pa. | John S. Follmer, M.D. |
| Failing, William Clark, | Albany, | N. Y. | H. C. Blair. |
| Farley, Levi James, | Chester, | Pa. | Wm. H. Farley. |
| Few, Colin Spangler, | Middletown, | Pa. | Geo. B. Evans. |
| Filer, Burritt Boynton, | Hammonton, | N. J. | J. F. Meade, M.D. |
| Frederici, John Koch, | Auburn, | Pa. | E. F. Haenchen. |
| Funches, Cardoza Marion, | Rowesville, | S. C. | J. M. Hillan. |
| Garrison, Joseph Miller, Jr., | Elmer, | N. J. | Theodore Campbell. |
| Gessford, Otice Eugene, | Lippincott, | Pa. | Funk & Groff. |
| Godshall, Samuel R., | Soudertown, | Pa. | Smith, Kline & French Co. |
| Goodfellow, Charles Rumney, | Philadelphia, | Pa. | E. M. Wallington & Co. |
| Grakelow, Ralph, | Tower City, | Pa. | Ira P. Amick. |
| Gross, Paul Herbert, | York, | Pa. | R. Wm. Ziegler. |
| Harry, Hamilton Maxwell, | Conshohocken, | Pa. | Jas. W. Harry. |
| Hebden, William, | Philadelphia, | Pa. | Caleb Scattergood. |
| Heim, Christian, Jr., | Philadelphia, | Pa. | Henry Mueller, M.D. |
| Hildebrand, Howard Ovid, | York, | Pa. | A. H. Lafean & Bro. |
| Hill, William Maurice, | Lansford, | Pa. | Wm M. Hill. |
| Hoffman, William Shalter, | Danville, | Pa. | G. C. Devine. |
| Hörst, Harry Lewis, | Lock Haven, | Pa. | T. C. Hilton & Co. |
| Hostelley, John Jos. Francis, | Collingdale, | Pa. | T. W. Hargreaves. |
| Howard, Horace Emory, | S. Hadley, | Mass. | J. J. Ottinger. |
| Howell, Harvey Field, | Easton, | Pa. | Geo. B. Evans. |
| Hundertmark, John Charles, | Cleveland, | O. | Acker Bros. |
| Ingling, Howard Edgar, | Riverton, | N. J. | Milton Cowperthwaite. |
| Jacoby, William Lawless, | Philadelphia, | Pa. | Bullock & Crenshaw. |
| Jaeger, Charles Frederick, | Philadelphia, | Pa. | E. E. Bostick. |
| Janisch, Frederick Wm., | Philadelphia, | Pa. | F. H. Davis. |
| Jefferis, David Strode, | Philadelphia, | Pa. | Funk & Groff. |
| Jennings, Isaac Astor, | Philadelphia, | Pa. | Theodore Campbell. |
| Johns, Frank James, | Pleasant Mount, | Pa. | H. C. Blair. |
| Jolley, John James, | Philadelphia, | Pa. | F. M. Apple. |
| Kessler, Lawrence Anthony, | Logan, | O. | E. F. Kessler. |
| Kirlin, Chas. Coleman Hagenbach | Shenandoah, | Pa. | P. P. D. Kirlin. |
| Koehler, George, | Philadelphia, | Pa. | E. F. Kaempfer. |
| Konover, Harold Doble, | Trenton, | N. J. | D. W. Baker. |
| Kramer, George Henry, | Philadelphia, | Pa. | Robert McNeil. |
| Kupfer, John Harry, | Butte City, | Mont. | C. W. Newton, M.D. |
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| McGehee, Hanford Bell, | Staunton, | Va. | Lawson C. Funk. |
| McNeil, Thomas Hunter, | Philadelphia, | Pa. | Robert C. McNeil. |
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| Matusow, Harry, | Minsk, | Russia | C. H. Bohn. |
| Metzler, Claude Dallas, | Harrisonville, | Pa. | J. A. Ferguson. |
| Morgan, Clayton Edward, | Lynn, | Mass. | Frank E. Morgan. |
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| Mueller, Charles August, | Philadelphia, | Pa. | Alex. G. Keller. |
| Nebel, Charles William, | Philadelphia, | Pa. | A. S. Hollopeter. |
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| Parry, William Hough, | Newtown, | Pa. | M. B. Fretz. |
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| Pearce, Samuel Robert, | Manasquan, | N. J. | Andrew Blair. |
| Peiffer, Charles Oscar, | Morton, | Pa. | J. M. Sharp. |
| Peterson, Walter Nickerstaff, | Philadelphia, | Pa. | C. W. Shull. |
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| Reese, John Bull, | Centralia, | Pa. | Geo. W. Davis. |
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| Rieben, Ernest, | Philadelphia, | Pa. | A. A. G. Starck, M.D. |
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| Seipel, Harry Bertram, | Philadelphia, | Pa. | Leidy Seipel. |
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| Smiley, Laura Marguerite, | Philadelphia, | Pa. | E. R. Smiley, M.D. |
| Smith, Justin Tone, | Windsor, | Vt. | W. A. Rumsey. |
| Snyder, Harry Lamar, | Annandale, | N. J. | H. A. Nolte. |
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## LIST OF SPECIAL STUDENTS.—1896–97.

| *Name.* | *Place.* | *State.* | *Department.* |
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| Collings, Walter Nagle, | Philadelphia, | Pa. | Chemistry. |
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| Hoft, William Irving, | Philadelphia, | Pa. | Chemistry. |
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| Krider, C. Richard, | Philadelphia, | Pa. | Chemistry. |
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# THE AMERICAN JOURNAL OF PHARMACY

*FEBRUARY, 1897.*


## ON THE VOLUMETRIC ESTIMATION OF ACETONE.


BY LYMAN F. KEBLER.


Since the modern developments in the manufacture of acetone, the application of this product has been developed in many directions. As a solvent its uses appear to be almost unlimited, in both analytical and technical operations. Ethyl alcohol, wood alcohol, ether and acetic ether have been displaced by it in many instances, not only as being a more economical solvent, but a better general solvent. Prof. S. P. Sadtler[1] has proposed its use for the technical analysis of asphalt; C. Kippenberger[2] has employed it as a solvent in volumetric determinations of alkaloids by means of Wagner's reagent; and H. Trimble and J. C. Peacock[3] have used it in the preparation of tannic acid. These are only instances of the possibilities of acetone.

Now, it can reasonably be expected that the manufacture of this product will be materially cheapened in due time, and, with this cheapening, samples of various degrees of purity will be met with; then the analyst will be called on to devise ways and means for deciding in favor of the deserving products.

At present, we are not in position to determine the acetone, or dimethyl ketone, in various mixtures with accuracy. The commercial acetone generally contains bodies, besides acetone, that respond to the iodoform reaction, on which all of our analytical methods are

[1] 1895, *J. Frank. Inst.*, **140**, 383.
[2] 1896, *Ztschr. anal. Chem.*, **35**, 10, and 422.
[3] 1893, AM. J. PHARM., **65**, 435; *Proc. Am. Pharm. Assoc.*, **41**, 110.

based. The writer examined a sample of acetone that contained 6 per cent. of material (higher ketones?) that possessed a boiling point of 80° C. and above; yet it proved on analysis to contain 20 per cent. of iodoform-yielding substances by our present methods.

The specific gravity is of little value, since there are a number of products formed during the destructive distillation of the acetates that possess practically the same specific gravity as acetone. An actual case will illustrate this fact admirably. A certain make of acetone was examined, and on submitting the results of the analysis the producer protested loudly. He maintained that their product contained 98 per cent. of pure acetone according to the alcoholometer. Would methyl alcohol contain 98 per cent. of acetone if, on immersing the alcoholometer, it sank to the 98 per cent. mark? Comment is unnecessary.

The boiling point is of considerable value, but some allowance must be made even for this constant. A sample, assaying 91·96 per cent. of acetone, yielded, on distilling 100 c.c., the following fractions: from 55°–58° C. = 6 c.c.; 58°–59° C. = 20 c.c.; 59°–60° C. = 30 c.c.; 60°–62° C. = 25 c.c.; 62°–65° C. = 10 c.c.; 65°–70° C. = 3 c.c.; 70° and above = 6 c.c. Another sample, assaying 96·95 per cent. of acetone, boiled between 56° and 61° C., with a small amount of residue.

A word about the stability of acetone at this point may not be inappropriate. On assaying a drum of acetone, it was found considerably below the requirements. On informing the manufacturer concerning it, he made the assertion that acetone deteriorated very materially in a month. This information was quite contrary to the writer's experience. For example, a sample of acetone had been kept by the writer for two years, about one-half of the time in a dark, dry cellar, in an ordinary greenish, cork-stopped, glass bottle; the remainder of the time the bottle and contents were kept in direct and diffused sunlight. This acetone assayed 97·12 per cent. This product certainly did not deteriorate much in these two years; for the best commercial acetone obtainable contains only from 97 to 98 per cent. of pure acetone. Dr. Squibb, in a private communication, writes thus on this point: "Nothing within our knowledge or experience has ever led us to suspect any spontaneous change in acetone by keeping, and I do not believe there is any such change either in full or partly filled vessels."

A. Lieben,[1] in 1870, discovered that certain organic groups, such as $CH_3$, COC —, $CH_3$ CH(OH)C —, $CH_3CH_2OH$, etc., when treated with iodine in the presence of an alkali, yield iodoform. Iodoform itself, however, was discovered in 1822, by Serullas.[2] With some of the groups the application of heat is necessary to bring about the reaction. Lieben also observed that methyl alcohol did not respond to this test, and suggested at the same time that this fact might be of service in establishing the purity of this alcohol.

Ten years later, G. Kramer[3] devised a gravimetric process, based on the iodoform reaction for estimating acetone in wood alcohol. The results obtained by this method were rarely concordant, consequently it was unsatisfactory.

From 1884 to 1888 much interest was manifested in this country concerning the manufacture of chloroform from acetone. During this period, W. R. Orndorff[4] and H. Jessel studied the action of chlorinated lime on acetone in the manufacture of chloroform. On the results of this investigation J. Messinger[5] based the first volumetric method for estimating acetone in wood alcohol. The method has been applied with success to all[6] mixtures in which acetone generally occurs.

The reactions[7] involved for this volumetric process are as follows:

$$I_2 + 2KOH = KIO + KI + H_2O.$$
$$CH_3COCH_3 + 6KIO = CH_3COCI_3 + 3KOH + 3KI.$$
$$CH_3COCI_3 + KOH = CHI_3 + KC_2H_3O_2.$$
$$KIO + KI + 2HCl = I_2 + 2KCl + H_2O.$$
$$KIO_3 + 5KI + 6HCl = 3I_2 + 6KCl + 3H_2O.$$

The solutions required for the process are as follows: 56 grammes of potassium hydroxide, free from nitrite, dissolved in distilled water and made up to 1 litre.

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[1] 1876, *Ann.* (Liebig) *Supp.*, 7, 218 and 377.

[2] 1822, *Ann. chem. phys.*, 20, 165.

[3] 1880, *Ber. d. chem. Ges.*, 13, 1000; *Ztschr. anal. Chem.*, 19, 498.

[4] 1888, *Am. Chem. J.*, 10, 363.

[5] 1888, *Ber. d. chem. Ges.*, 3366.

[6] See literature at the end of the article.

[7] There may be some question concerning the actual reactions, but the basis of calculation is not involved. Krämer expresses it in a single equation: $CH_3COCH_3 + 6I + 4KOH = CHI_3 + 3KI + KC_2H_3O_2 + 3H_2O$.

Solution of hydrochloric acid, specific gravity 1·025.

A decinormal solution of sodium thiosulphate.

A starch solution.

A dilute solution of acetone containing from 1 to 1½ per cent. of acetone by weight. This is prepared from the acetone or acetone solution to be examined. The writer prepares this by weighing the acetone in a beaker containing water, transferring to a graduated cylinder, rinsing the beaker well with water and making up to a definite volume.

Having prepared the above solutions, place from 25 to 30 c.c. of the potassium hydroxide solution into a suitable flask, add 1 or 2 c.c. of the diluted acetone solution, *very carefully* measured, or if greater accuracy is desired, carefully weigh the aqueous acetone, mix well, and run in from a burette, while rotating the flask, from 25 to 30 c.c. of the iodine solution; insert the stopple quickly and agitate vigorously for one minute. After shaking, render the mixture acid by means of the hydrochloric acid solution; add, while rotating, an excess of the sodium thiosulphate solution. Allow the mixture to stand several minutes, add the starch indicator, and re-titrate the excess of the sodium thiosulphate with the iodine solution. From the above data the per cent. of acetone can readily be calculated; thus 1 molecule of acetone (58) requires 3 molecules of iodine (762) to form 1 molecule of iodoform. Expressing it in the form of a proportion, letting $y$ equal the amount of combined iodine, and $x$ equal the amount of acetone, we have;

$$762 : 58 :: y : x \text{ or } x = y. \frac{58}{762} \text{ or } x = y. 0{\cdot}07612.$$

Before leaving the process, it may be well to direct attention to several important points. After adding the iodine solution, agitation must not be delayed if concordant results are desired, since the active agent KIO is rapidly converted into KI and $KIO_3$. Experiments have proven that it becomes inactive in one-half an hour. It is essential to allow the mixture to stand a few minutes after adding the sodium thiosulphate solution, in that the reaction is not immediate. It is necessary to add an excess of the iodine and sodium thiosulphate solution, respectively, at the time of adding them, in order to secure completed reactions.

MM. F. Robineau[1] and G. Rollin, in 1893, proposed another volumetric method for estimating acetone. This method was first brought to the writer's notice through the generosity of Dr. Squibb and the kindness of his chemist, Dr. L. L. Jackson, while visiting the laboratory of the former last summer. Prior to this time Messinger's process had been used exclusively by the writer. R. and R.'s method is applied by mixing an aqueous acetone solution with a strongly alkaline solution of potassium iodide and converting the acetone into iodoform by means of a titrated solution of sodium hypochlorite, the end reaction being determined by means of a bicarbonated starch solution.

The writer has not applied the above process to any extent, but has studied and worked with Dr. Squibb's[2] modification of the same considerably.

The solutions required for this modification and the methods of preparing them are as follows:

Pure acetone made by the bisulphite process.

An alkaline solution of potassium iodide. Dissolve 250 grammes of pure potassium iodide in distilled water and make up to 1 litre. Dissolve 257 grammes of sodium hydroxide, purified by alcohol, in distilled water and make up to 1 litre. Allow the insoluble part to subside and mix 850 c.c. of the clear solution with the litre of potassium iodide.

Solution of hypochlorite, containing about $2\frac{6}{10}$ per cent. of available chlorine. To each litre add 25 c.c. of sodium hydroxide solution, specific gravity 1·29.

Bicarbonated starch solution. Treat 0·125 gramme of starch with 5 c.c. of cold water, then add 20 c.c. of boiling water and boil a few minutes, cool and add 2 grammes of sodium bicarbonate. The keeping quality of this solution is certainly an agreeable surprise. A sample prepared four months ago is as delicate to-day as a freshly prepared one.

The manner of application. Prepare an aqueous solution of the pure acetone of such a strength that each 10 c.c. contains exactly $\frac{1}{10}$ gramme of the acetone. Of this solution, accurately measure,

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[1] 1893, *Moniteur Scientifique* (4), 7, pt. 1, 272; translation in *J. Am. Chem. Soc.*, 18, 1068.

[2] 1896, *J. Am. Chem. Soc.*, 18, 1068.

with a pipette, 10 c.c. into a 50 c.c. beaker, add 20 c.c. of the alkaline potassium iodide solution and mix well. To this mixture add, from a burette, while vigorously agitating the contents of the beaker, the standard solution of sodium hypochlorite in rapid drops until about 9 c.c. have been run in. Allow the iodoform to subside, which it does rapidly, then add a drop or two of the hypochlorite solution; should a cloudiness result, add another ½ c.c. of the hypochlorite solution; agitate well; allow the iodoform to subside, etc., until just a faint turbidity results on adding the hypochlorite solution. Now agitate the solution well; transfer a small drop to a white porcelain tile; in a similar manner, bring a drop of the bicarbonated starch solution near this drop, then connect the two drops by means of a glass rod. If a blue color does not develop at the point of union, not enough of the hypochlorite solution has been added. Continue adding the hypochlorite solution, a small quantity at a time, agitating and testing, until a blue line is just formed at the meeting of a drop of the starch solution and a drop of the mixture titrated. Ordinary starch solution is valueless for this end reaction.

The number of c.c. of the hypochlorite solution required to complete the reaction is the amount of this active agent needed to convert $\frac{1}{10}$ gramme of acetone into iodoform. From this basis calculations for any amount of acetone are readily made.

In estimating the amount of acetone in any solution, first prepare an aqueous solution containing from 1 to 2 per cent. of acetone by weight, then proceed as above for establishing the standard with pure acetone. For fuller details the reader is referred to the original communication.

The two latter methods will meet with two objections: first, a *pure acetone*, and second, the tedious, time-consuming drop end reaction. Pure acetone is not so readily prepared. It necessitates the preparation of an acetone absolutely free from other ketones, before the bisulphite process can be applied. The writer has not been able to secure acetone that assayed more than 99·73 per cent. of pure acetone by either Messinger's process or the one presently to be described. This small quantity may have volatilized, but the loss would be practically constant for all the methods, consequently, the basis of calculation for the pure acetone methods would be 100, when in reality it is less. The difference may again be due to some

slight inaccuracies in the volumetric solutions. Grant that absolutely pure acetone is made, it is not readily secured when desired.

The writer has adapted Dr. Squibb's modification so that both the pure acetone and the drop end reaction are eliminated. In this process the following solutions are employed:

A 6 per cent. solution of hydrochloric acid.

The alkaline solution of potassium iodide of Dr. Squibb.

A decinormal solution of sodium thiosulphate.

Sodium hypochlorite solution, about $\frac{4}{5}$ normal, or containing from $2\frac{6}{10}$ to 3 per cent. of available chlorine. To prepare this solution, intimately mix 100 grammes of bleaching powder (35 per cent.) in 400 c.c. of distilled water. Dissolve 120 grammes of crystallized sodium carbonate in 400 c.c. of hot distilled water, and immediately pour the latter into the former. Cover the vessel and allow to cool, then decant the clear liquid, filter the remainder and to the filter add enough water to make up to 1 litre. To each litre add 25 c.c. of sodium hydroxide solution, specific gravity 1·29.

An aqueous solution of acetone containing from 1 to 2 per cent. by weight. Prepared as for Messinger's process above. To estimate the acetone, place 20 c. c. of the alkaline potassium iodide solution into a suitable flask add 10 c.c. of the diluted aqueous acetone solution, or weigh if greater accuracy is desired; mix well, and run in from a burette, while rotating the flask, an excess of the sodium hypochlorite solution, insert the stopple quickly and shake well for one minute. After agitating, render the mixture acid by means of the hydrochloric acid solution, add, while rotating the flask, an excess of the sodium thiosulphate solution, and allow the mixture to stand a few minutes. Then add the starch indicator and re-titrate the excess of the sodium thiosulphate.

The relation of the sodium hypochlorite solution to the sodium thiosulphate solution being known, the percentage of acetone can readily be calculated from the above data. One atom of available chlorine will liberate 1 atom of iodine from the potassium iodide of the alkaline solution, or 1 c.c. will liberate just enough iodine to make 1 c.c. of iodine solution of the same normal strength as the sodium hypochlorite solution originally was; therefore, by reading the number of c.c. of sodium hypochlorite solution consumed as so many c.c. of iodine solution of the same normal strength, we reduce the calculation to the basis of iodine. For explanation from here see Messinger's process above.

Example of calculation. Ten c.c. of the acetone solution, containing 1 gramme of the solution to be analysed, required 14·57 c.c. of N $\times$ 0·806 sodium hypochlorite solution, which formed 14·57 c.c. of iodine solution of the same strength; or combining we have:

$$\frac{14{\cdot}57 \times 0{\cdot}806 \times 0{\cdot}1265 \times 0{\cdot}07612}{1 \text{ gramme of solution.}} = \text{amount of acetone} = 11{\cdot}307 \text{ per cent.}$$

On comparing Messinger's, Dr. Squibbs' and the writer's adaptation with the same solution, the following results, in per cent. were obtained:

| | Messinger. | Squibb. | Author. |
|---|---|---|---|
| Pure acetone . . . . . . | 99·69 | 99·95 | 99·73 |
| Residue 80° C. and above . | 20·00 | 19·67 | 20·39 |
| Purified by fraction . . . | 99·03 | 99·00 | 99·41 |
| Commercial acetone . . . | 96·23 | 96·00 | 96·63 |
| " " . . . | 98·00 | 97·83 | 97·93 |
| " " . . . | 94·30 | 94·00 | 94·46 |
| " " . . . | 94·80 | 94·70 | 94·81 |
| " " . . . | 97·12 | 96·23 | 96·42 |
| " " . . . | 94·93 | 94·80 | 94·39 |
| " " . . . | 96·88 | 96·56 | 96·79 |
| " " . . . | 97·32 | 97·28 | 97·45 |
| " " . . . | 90·74 | 89·03 | 90·51 |
| " " . . . | 98·82 | 96·11 | 98·62 |
| " " . . . | 92·32 | 92·20 | 92·94 |
| Wood alcohol . . . . | 14·61 | 14·49 | 14·78 |
| " " . . . . . . . | 11·81 | 11·73 | 12·00 |
| Crude wood alcohol . . . | 11·23 | 11·00 | 11·42 |

The above table clearly shows that the results obtained by Dr. Squibb's process are a trifle too low, notwithstanding the fact that its basis of calculation gives it some advantage. The method is represented to yield satisfactory results for ordinary work, and that it certainly does. The difficulty with this method lies in the end reaction. According to some experiments made by the writer, it is necessary to have present a larger excess of the active agent, to bring about the completed reaction, than the end reaction allows.

The iodoform reaction with ethyl alcohol is an endothermic one, consequently its presence does not interfere with the estimation of acetone, which does not require the presence of external heat to bring about the reaction. The same holds true for all other groups of endothermic reaction.

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# TERPIN HYDRATE.

BY EDWARD T. HAHN.

In 1840, A. Wiggers contributed an article to the *Annalen der Chemie*, **33**, 358, on the crystalline substance from turpentine oil, to which, however, he applied the name *turpentine camphor*. He employed a mixture of nitric acid, alcohol and turpentine oil, and in 1846[1] (*Annalen der Chemie*, **57**, 247) reported a formula for making the substance on a large scale, stating that it could only be obtained from that variety of turpentine which yielded a crystalline compound with hydrochloric acid.

The method suggested by Wiggers was tried with commercial oil of turpentine, but it failed to produce any crystalline compound. Knowing that the oil of turpentine found on the market at the present time is occasionally adulterated with some of the heavier petroleum oils, a quantity of the commercial oil was procured and distilled with lime and water. An oil having a specific gravity of

[1] AM. JOUR. PHARM., **12**, 286.

0·856, and a boiling point of from 154° to 157° C., was obtained, and this product was used in all my experiments.

The first method tried was one suggested by Carl Hempel (*Annalen der Chemie*, **153**, 71), using the following quantities:

| | |
|---|---|
| (1) Oil of turpentine | 120 c.c. |
| (2) Alcohol (sp. gr., 0·816) | 30 " |
| (3) Nitric acid (sp. gr., 1·35) | 30 " |

These liquids were mixed in a flask in the order indicated by the numbers, and allowed to stand three days, shaking occasionally. The mixture separated into two layers, the lower one becoming quite dark in color. On the third day it was poured into a flat dish and 15 c.c. of alcohol added, and allowed to stand in a room having a temperature of about 18° C.

Crystals began to form within five days, and at the end of two weeks they had separated from the mother liquor. About 13 grammes of crystals were thus obtained. This product was purified by recrystallization in a solution of boiling alcohol, and yielded 8 grammes of terpin hydrate, which was found to answer all the U.S.P. requirements.

The mother liquor was allowed to stand for a short time, and another crop of crystals was obtained; but these, when tested with sulphuric acid, did not give the characteristic deep orange color, but a light, pinkish one, which quickly faded.

The next method tried was one suggested by Wm. A. Tilden (*Jour. Chem. Soc. Lond.*, **33**, 247), the following being the proportions of liquids used:

| | |
|---|---|
| Oil of turpentine | 60 c.c. |
| Alcohol | 30 " |
| Nitric acid (sp. gr., 1·40) | 60 " |

In this method and all others suggested by Tilden, nitric acid having the specific gravity of 1·40 was employed, but the writer's experience with acid of this strength was that a thick resinous-like mass was obtained, which showed no signs of crystallization.

A method was also given by F. Flawitzky (*Jour. Chem. Soc. Lond.*, **38**, 264), in which he used sulphuric instead of nitric acid, and obtained a compound having the formula $C_{10}H_{18}O$.

As ethyl alcohol commands a comparatively high price at the present time, methyl alcohol was substituted for it, and the following formula was found to be very satisfactory:

| | |
|---|---|
| (1) Oil of turpentine . . . . . . . . . . . . . . . . . . . . . | 120 c.c. |
| (2) Methyl alcohol (sp. gr., 0·801) . . . . . . . . . . . . . . | 30 " |
| (3) Nitric acid (sp. gr., 1·35) . . . . . . . . . . . . . . . . | 30 " |

These liquids were mixed in the order indicated and allowed to stand in a flask three days and then poured into a flat dish. Taking advantage of the very slight solubility of terpin hydrate in water, 30 c.c. of this liquid were added to the mixture, with the result that the crystals separated in a much shorter time than they did with the methods previously employed. No additional crystals were formed on allowing the mixture to stand several days. The weight of the crystals obtained was 7·32 grammes, and these, on purifying from hot solution of methyl alcohol, yielded 3·2 grammes of terpin hydrate, which answered to all the tests for the U.S.P. compound.

By further evaporation an additional quantity of crystals may be obtained.

The crystals obtained by the use of methyl alcohol had a closer resemblance to the article which is found in the market, and also a more aromatic odor than those obtained by the employment of ethyl alcohol.

Amyl alcohol likewise may be used in making terpin hydrate.

An explosion occurred a few years ago (*Proc. Am. Pharm. Assoc.*, 1887) in a Parisian laboratory during the manufacture of terpin hydrate. The following proportions of liquids were employed:

| | |
|---|---|
| Oil of turpentine . . . . . . . . . . . . . . . . . . . . . | 72 L. |
| Alcohol . . . . . . . . . . . . . . . . . . . . . . . . . | 50 " |
| Nitric acid . . . . . . . . . . . . . . . . . . . . . . . | 17 Kg. |

The mixture was usually cooled in stone jars set in water, but as these were all in use at the time, a part of the mixture was poured into a wooden cask, to cool off, and as the wood did not conduct the heat away rapidly enough, a violent explosion took place, doing much damage.

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*Indian podophyllum*, according to W. R. Dunstan (*Imp. Inst. Jour.*, December, 1896), is derived from Podophyllum emodi, and contains two to three times as much resin as the American podophyllum from P. peltatum. Dr. Mackenzie finds that the two resins (Indian and American) are identical in their medicinal effects, and that there is no reason why the resin obtained from the Indian drug should not be substituted for the American resin.

# SOLANUM CAROLINENSE.

By Charlton G. Johnson, Ph.G.

(Abstract from Thesis.)

Since its introduction to the medical profession by Dr. J. L. Napier, in 1889, several contributions to the chemistry of Solanum

*Fig. 1* represents a portion of a branch of Solanum Carolinense. It shows the spiny stem, bearing the rather irregularly shaped leaves, with the small axillary leaves and the racemose flowers.

Carolinense have appeared in this Journal. In the meantime pharmacists have become better acquainted with the botany of this plant.

The microscopical characters, however, have not been so fully investigated. But, at the beginning of this article, the author wishes to call attention to a slight difference which was observed in the fruit (or berry, as it is called), obtained from two sections of the country. In the specimens obtained from the South, mainly Georgia and Florida, the calyx, though adherent, was recurved, while the berries gathered near Philadelphia had the calyx adhering to the fruit.

A transverse section of the root (*Fig. 4*) shows it to have a concentric structure caused by irregular, alternating zones of wood-

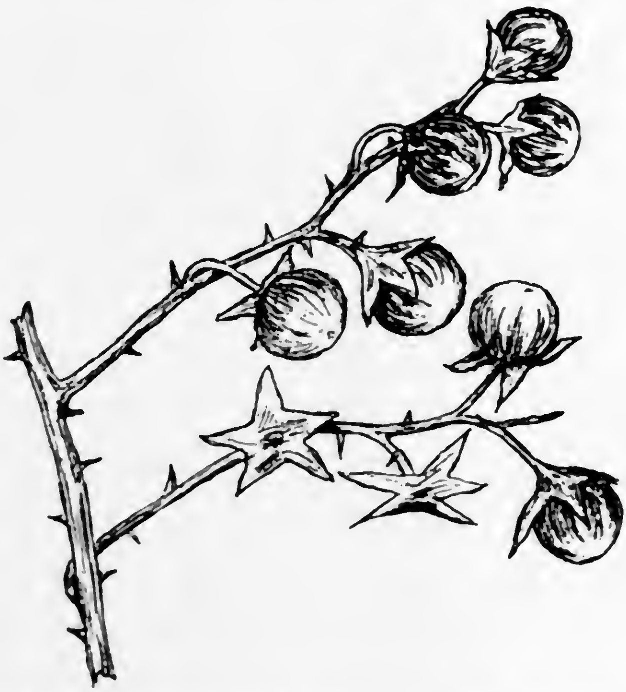

*Fig. 2* shows a small portion of a branch bearing the fruit. Natural size. The berries frequently grow much larger.

parenchyma and vascular tissues. The cork tissue replacing the epidermis is composed of about three layers of cells, with the rough fissured remains of older cork cells exterior. The cork meristem in the root, as well as in the stem, shows quite plainly. The parenchyma cells of the cortex are larger in the middle bark than near the epidermis, becoming very much smaller and elongated longitudinally near the cambium zone, while in the outer and inner portions of the cortex they are, from mutual pressure, much distorted and elongated tangentially. The ducts of the xylem are large and

numerous; and seen in longitudinal-radial section (*Fig. 5*), they prove to be pitted, the pits showing an elliptical marking within a larger circular one. Spiral, annulate and reticulate ducts are also

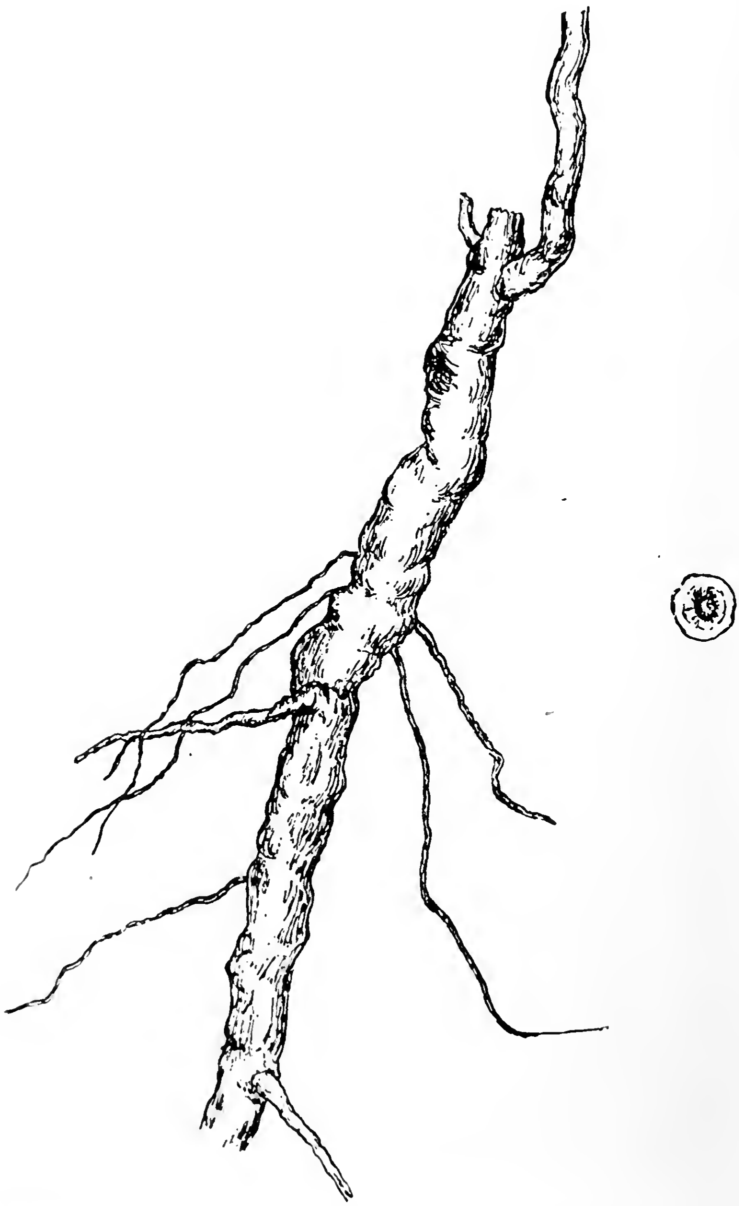

*Fig. 3* is a drawing of the root of Solanum Carolinense in the fresh state. It shows the natural size of the root when about two years old.

present. The libriform cells show markings from the pressure of adjacent cells, and are usually forked at one end. In the portions of the wood studied no collenchyma was found and bast-fibres were

also absent. The medullary rays are distinct and slightly undulate, the number of rows varying from two to five or six.

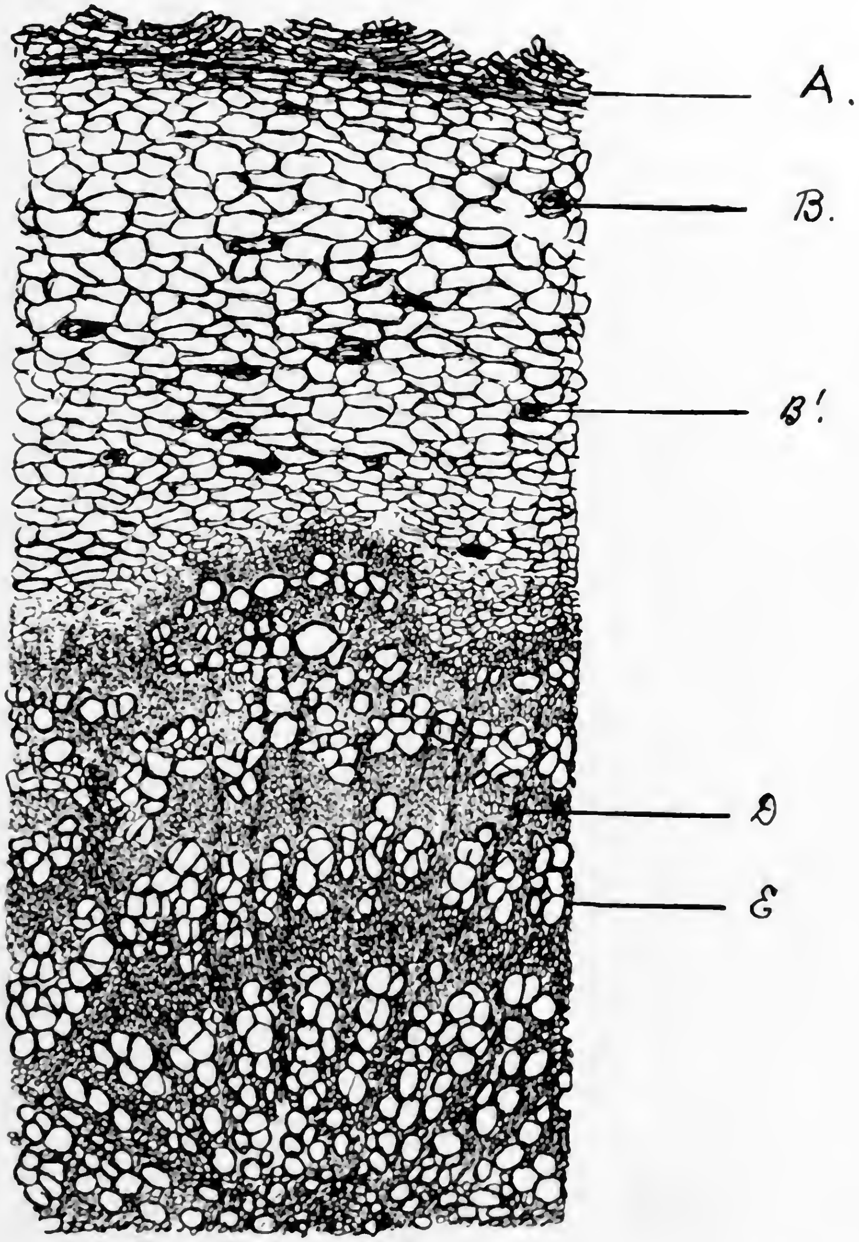


*Fig. 4*, portion of a transverse section of a root of Solanum Carolinense, magnified 45 diameters. *A*, ruptured cork tissue; *b* and *b'*, secretion cells containing calcium oxalate; *c*, cambium zone; *d*, medullary ray; *e*, one of the concentric layers of ducts, alternating with wood parenchyma.

The underground stem (*Fig. 6*) shows the pericycle relatively thicker and the cortex thinner than in the root. The cork tissue

resembles that of the root, except that a part of the epidermis is present. Collenchyma is found in the younger parts of the stem, though absent from the older portions. No bast-fibres were found.

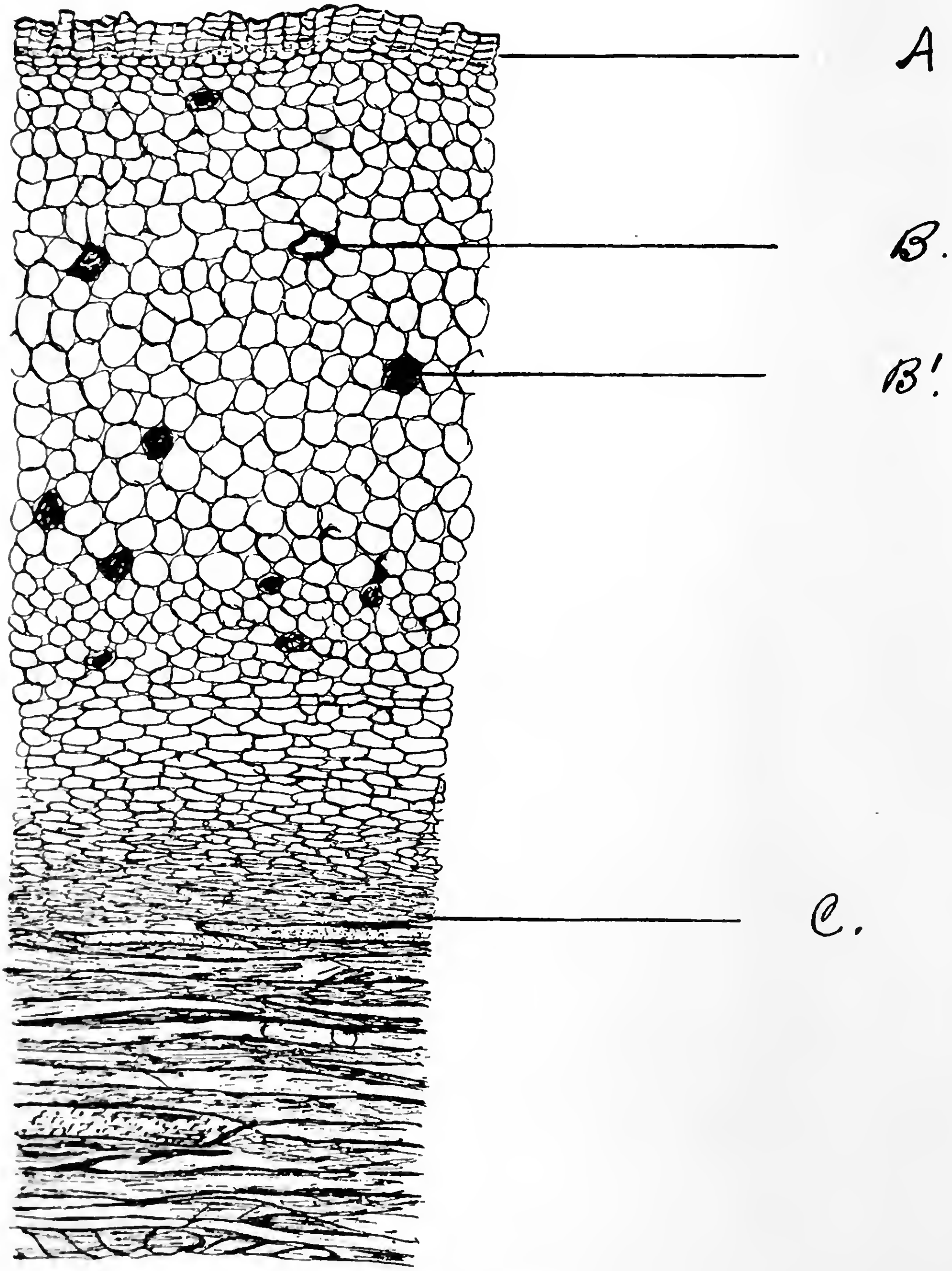


*Fig.* 5, longitudinal-radial section, made from a young root of Solanum Carolinense having a thick cortex, magnified 35 diameters. *A*, cork tissue; *b*, *b'*, secretion cells of calcium oxalate; *c*, the cambium, with the ducts of the xylem on one side and the phloem tissue on the other.

The cortex is mainly composed of parenchyma tissue; the cells are round, but otherwise correspond to the same tissue in the root. The woody tissue is rather irregular in width, and beside the phloem tissue on its exterior, there is a distinct inner phloem, which, though narrower in some places than in others, is distinctly discernible. The pith is composed of large parenchyma cells.

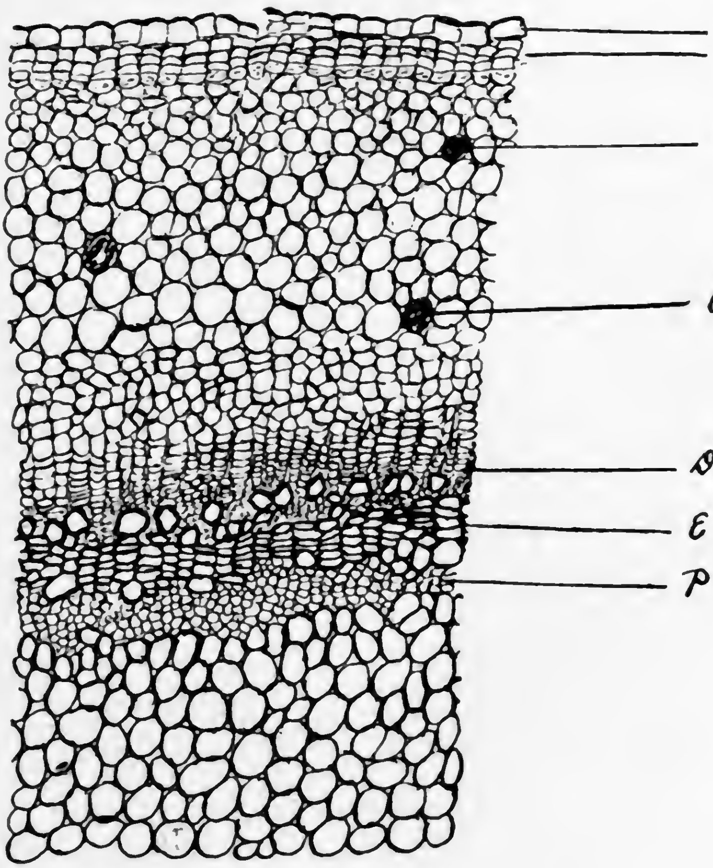


*Fig. 6*, transverse section of underground stem of Solanum Carolinense (from a portion just at or beneath the ground), magnified 56 diameters. *A*, epidermis; *b*, cork cells; *c*, *c'*, secretion cells of the cortex; *d*, cambium; *e*, xylem; *p*, secondary or inner phloem, beneath which are the soft, parenchymatous cells of the pith.

The petiole, as seen in transverse section in *Fig. 7*, shows three bi-collateral bundles. Beneath the epidermal tissue are several rows of collenchyma cells, and next to these are the parenchyma cells surrounding the vasal bundles. Two large secretion reservoirs are found, one on each side, near the upper surface. Some starch is present in the parenchymatous cells of the stem, principally in the

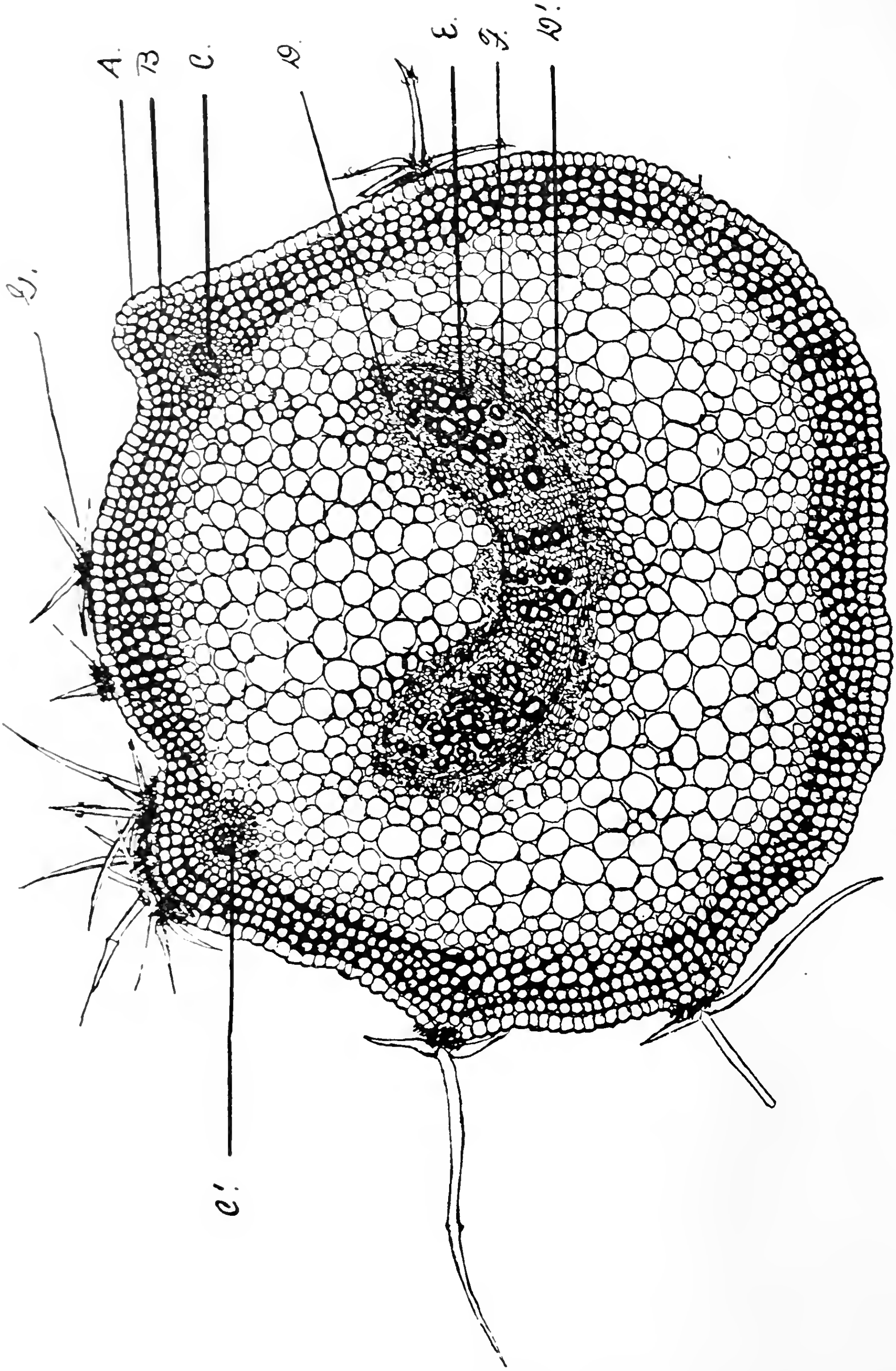


*Fig. 7*, transverse section of a younger portion of a petiole of Solanum Carolinense. Magnification, 65 diameters. *a*, epidermis ; *b*, collenchyma tissue ; *c*, *c'*, large secretion reservoirs ; *d*, *d'*, upper and lower phloem tissues, respec tively ; *e*, xylem ; *f*, meristem, found only on the lower side ; *g*, stellate hair.

cortex, but it is more especially found in the cortical tissue of the root, chiefly near the pericycle. In some of the specimens examined, the whole of the cortex seemed filled with starch granules, while others failed to show its presence so profusely. The grains

*Fig. 8*, starch grains found in the root of Solanum Carolinense; magnified about 400 diameters.

show distinct stratification lines. In shape some were oblong, some ellipsoidal and others in clusters of two, three or four, the oval or oblong-ovate being, however, the most common form. The hilum is distinct, eccentric, and usually presents a fissured appearance.

Some of the grains were bi-nucleated and others possessed a peculiar, contorted shape. The starch grains resemble somewhat in shape those of another plant of the same genus, Solanum tuberosum, the potato. Scattered irregularly through the cortex of the root, and less profusely in the stem, are secretion cells containing a peculiar, mucilaginous-like matter. On treating these cells with potassium hydrate test solution they were rendered clear, and their contents now shown to be a white, granular or crystalline substance. This substance, by dissolving in warm hydrochloric acid, without effervescence, proved to be calcium oxalate. The tests for tannin failed to show its presence. On testing for resins and oils, with alcannin solution, small quantities of these substances were found in some of the starch-bearing cells and also in some of the lignified tissues.

In conclusion, the author wishes to express his thanks to Messrs. Parke, Davis & Co. for specimens kindly furnished, and to Dr. M. V. Ball for his valuable assistance in the microscopical work.

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## SOLANUM CAROLINENSE.

By M. Clayton Thrush, Ph.G.

(Abstract from Thesis.)

The author found the fruit to contain the largest amount of alkaloidal constituents; consequently, it is the most active therapeutically. The leaves came next in strength, then the root, and finally the stem, which is the least active.

In order to study the drug microscopically, sections were cut by means of the microtome from specimens of the plant which had been preserved in strong alcohol. They were then placed in Labarraque's solution until properly bleached, except those intended for the tests for tannin and oleoresin. They were then treated as follows: For double staining some of the sections were treated with iodine green, then washed to separate excess, then passed through dilute, strong and finally absolute alcohol, to anhydrate them. They were then treated with eosin, oil of cloves, and from that through pure oil of cloves, and mounted in xylol balsam. The others, after being treated with the reagent, were washed to separate excess, anhydrated by absolute alcohol and mounted in xylol

balsam. The sections which were tested for tannin and oleoresin were treated direct with ferric chloride in absolute alcohol and alcannin, respectively, then mounted in xylol balsam. These latter tests were confirmed by treating dry sections with ammonio-

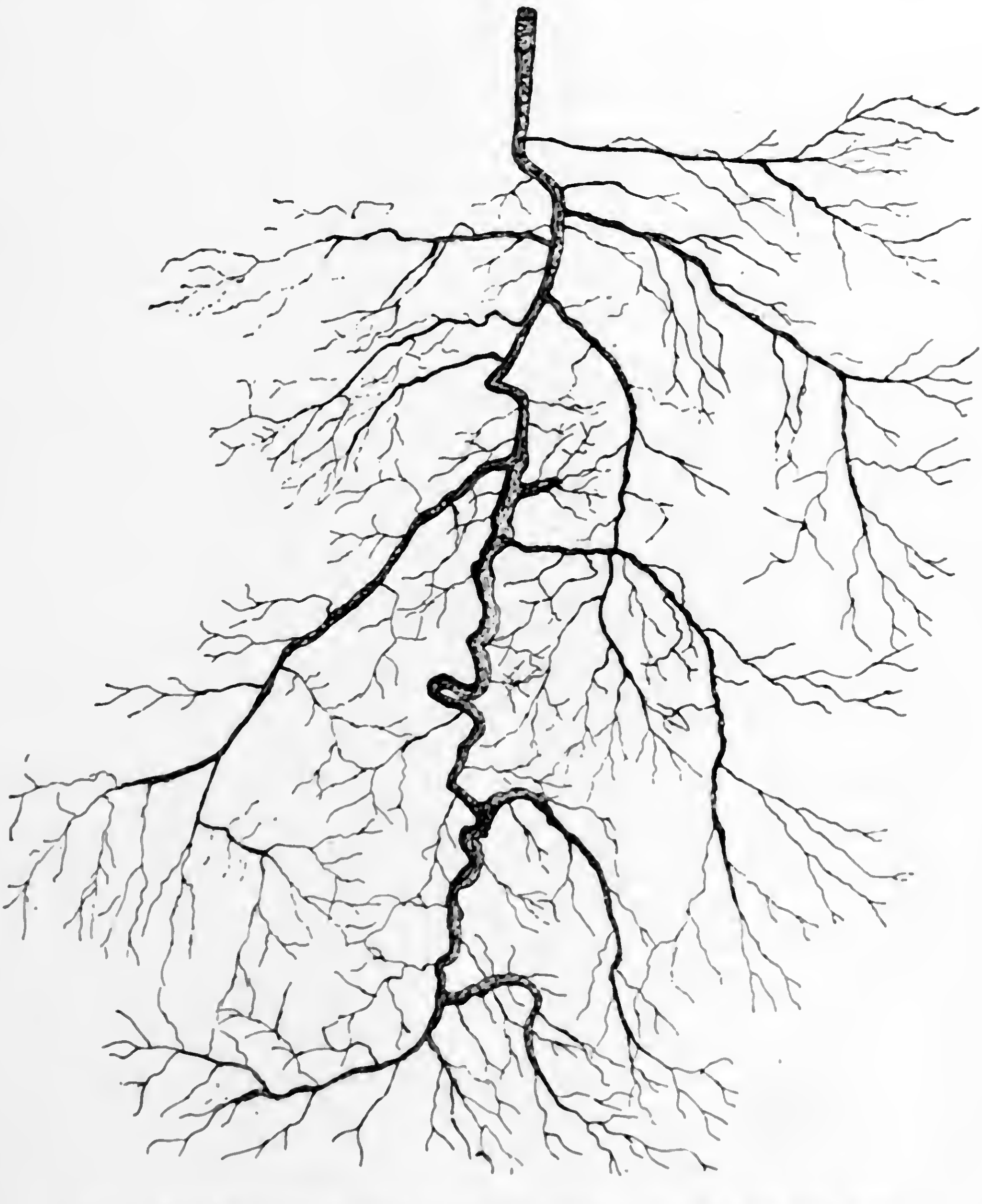

*Fig. 1*, underground portion of the plant, one-half natural size.

ferric alum. By treating dry sections of the young root for tannin with ferric chloride in absolute alcohol, tannin precipitates were produced in the central parenchyma and the cortical parenchyma. In the old root tannin precipitates were produced in

a great number of the cells of the cortical parenchyma, also in a few cells of the phloem tissue and the medullary rays. In the mature stem, indications of tannin were obtained in abundance, in the pith parenchyma, medullary rays, cambium zone, phloem, cortical parenchyma and suberous tissue. In the leaf indications were produced in all of the different tissues. In the fruit tannin indications were obtained in the cells of the section irregularly scattered.

The tannin was estimated by the "hide powder method," and found to be 3·10 per cent. in the leaves; 2·27 per cent. in the root;

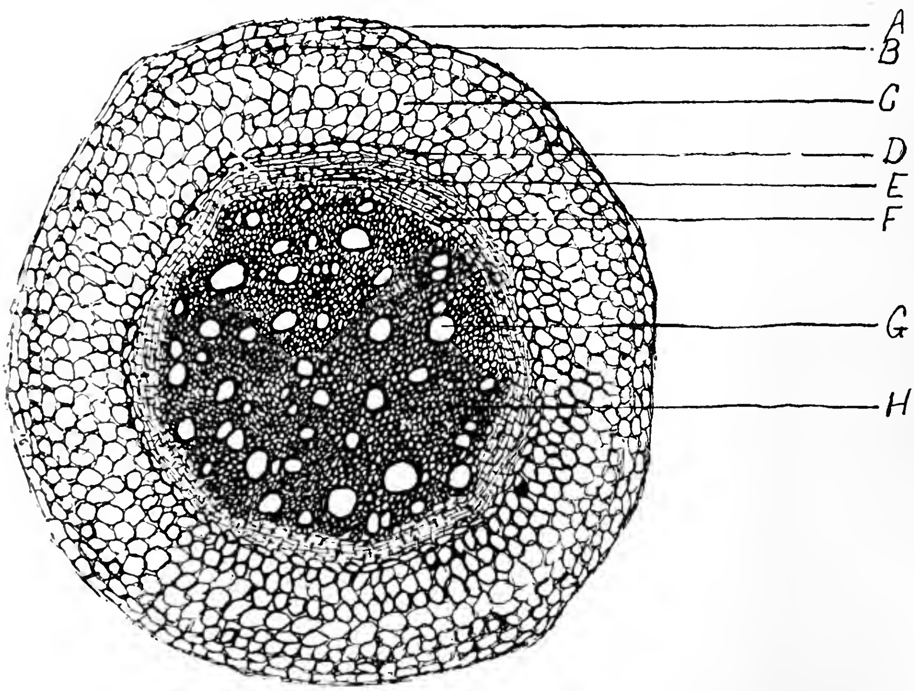


*Fig. 2*, transverse section of rootlet of Solanum Carolinense, magnified 75 diameters. *A*, epidermis; *b*, collenchyma tissue; *c*, cortical parenchyma; *d*, endodermis; *e*, phloem tissue; *f*, cambium zone; *g*, duct of xylem; *h*, xylem tissue, consisting of wood cells and ducts.

8·06 per cent. in the fruit; 5·06 per cent. in the stem—all calculated for absolutely dry material.

*Fig. 1* represents the underground portion of the plant.

*Root.*—Phloroglucin and hydrochloric acid stain the xylem tissue, which is strongly lignified, a bright red. In the young undeveloped root central parenchyma exists, but as the root becomes older the xylem of the radial bundle extends to the centre with the development of rings of growth, medullary rays and a cambium zone, and

has a similar appearance to the structure of a dicotyl stem. Zinc chloriodide iodine shows an abundance of starch in the cells of the medullary rays, phloem, collenchyma and cortical parenchyma. Chloral hydrate iodine gives the same indications. The epidermis of the mature root consists of several rows of suberous tissue, which exfoliates at the surface; beneath this is a circle consisting of

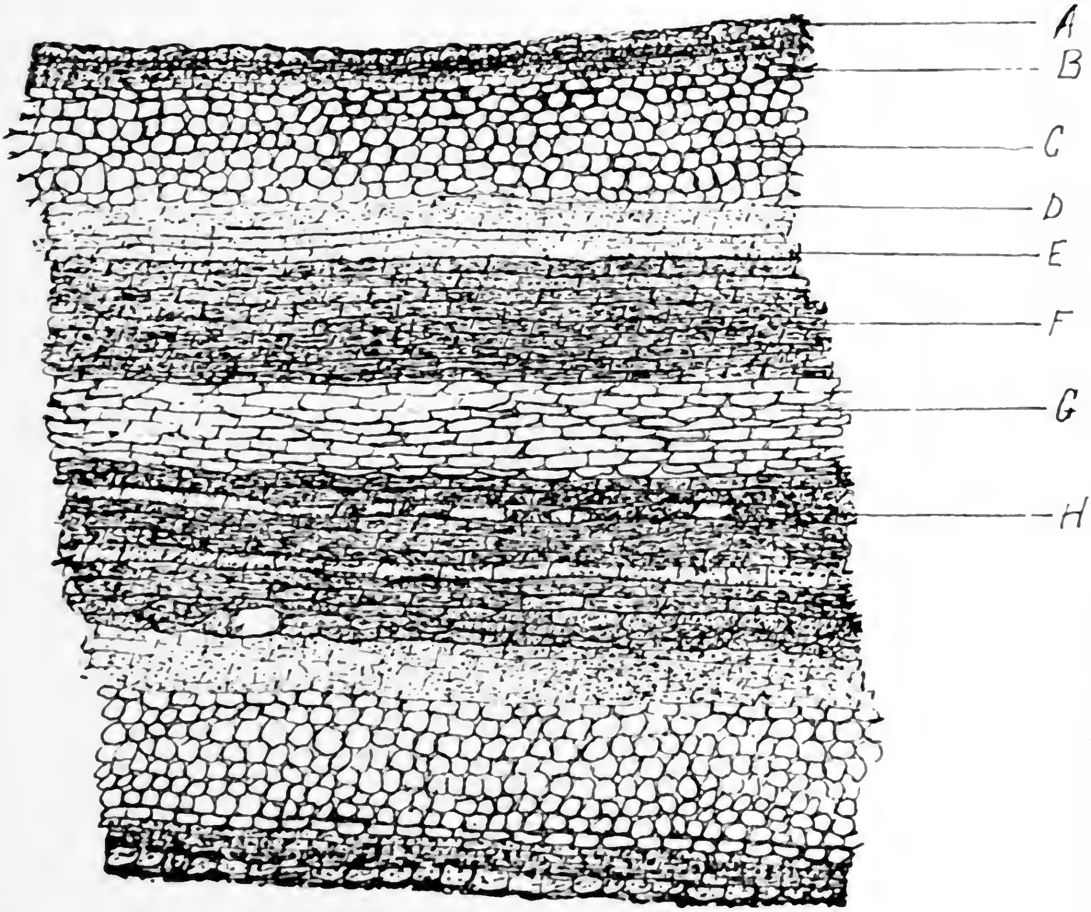


*Fig. 3*, longitudinal section of young root of Solanum Carolinense, magnified 75 diameters. *A*, epidermis, not yet displaced by cork cells forming beneath; *c*, cortical parenchyma; *d*, phloem tissue; *e*, cambium zone; *f*, xylem tissue, consisting of wood cells and ducts; *g*, central parenchyma, not yet developed into xylem tissue; *h*, duct of xylem.

several rows of collenchyma tissue; interior to this a layer of cortical parenchyma, consisting of several tiers of cells, then the phloem tissue and finally the xylem, which extends to the centre and is separated from the phloem by the cambium zone. The different rays are separated by the medullary rays.

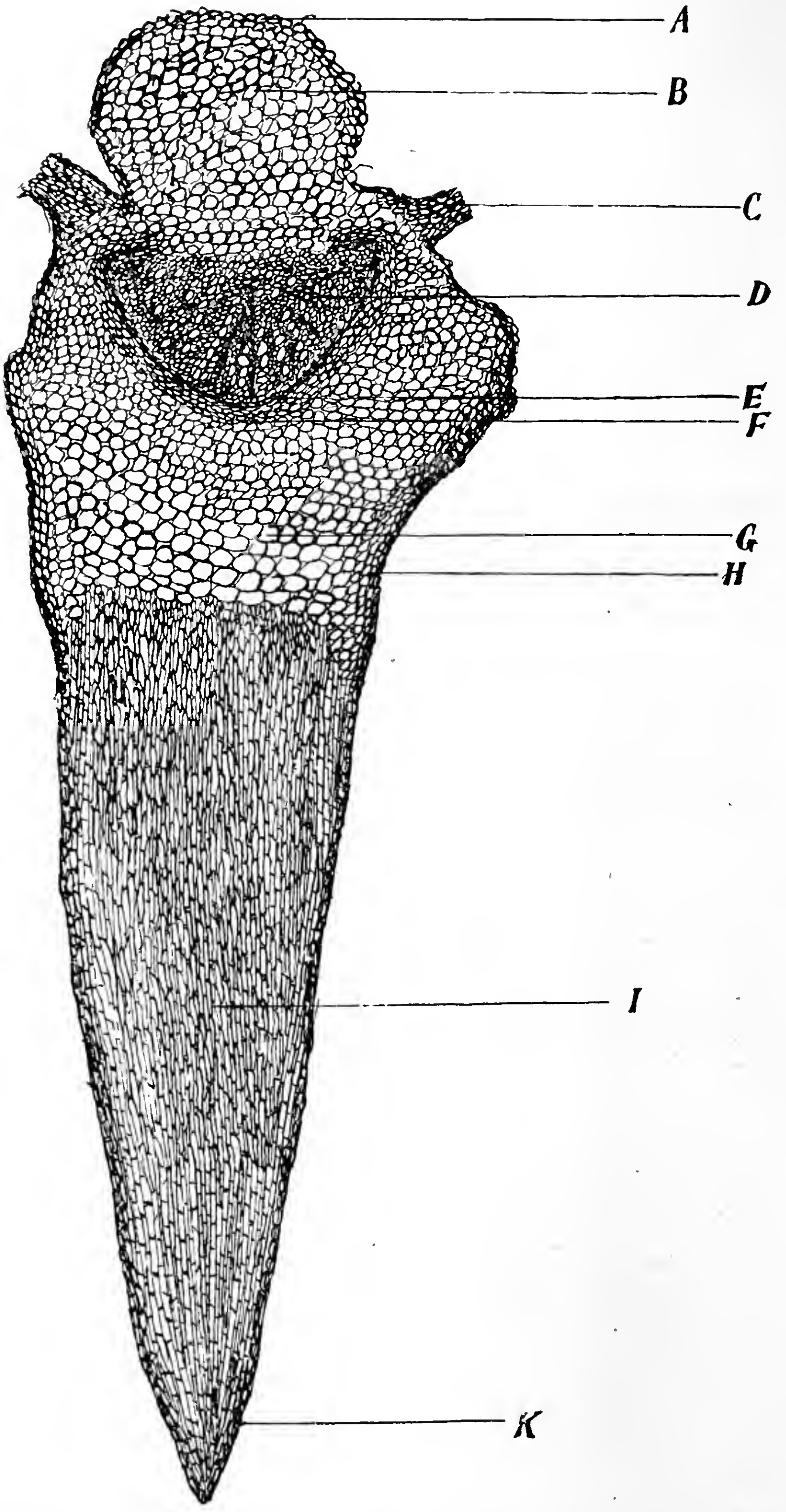


*Fig. 4*, transverse section of the mid-rib of a leaf of Solanum Carolinense, with one of the prickles, which is shown in longitudinal section, attached; magnification, 150 diameters. *A*, epidermal cells; *b*, parenchyma of upper portion of mid-rib; *c*, a portion of the lamina of the leaf; *d*, xylem tissue of mid-rib; *e*, cambium zone; *f*, phloem tissue of mid-rib; *g*, parenchyma of lower portion of mid-rib; *h*, collenchyma tissue; *i*, slightly lignified tissue of the prickle, which occurred on the mid-rib and was cut through longitudinally; *k*, epidermal tissue, more lignified.

*Stem.*—Zinc chloriodide iodine shows starch in the central parenchyma, in the cells of the medullary rays, in the cortical parenchyma, and in the cambium zone. Chloral hydrate iodine gives the same results, as does also potassium iodide iodine, but much more prominently, especially in the central parenchyma tissue, which contains an abundance of the substance. Phloroglucin and hydrochloric acid stain the xylem tissue, which is strongly lignified, a

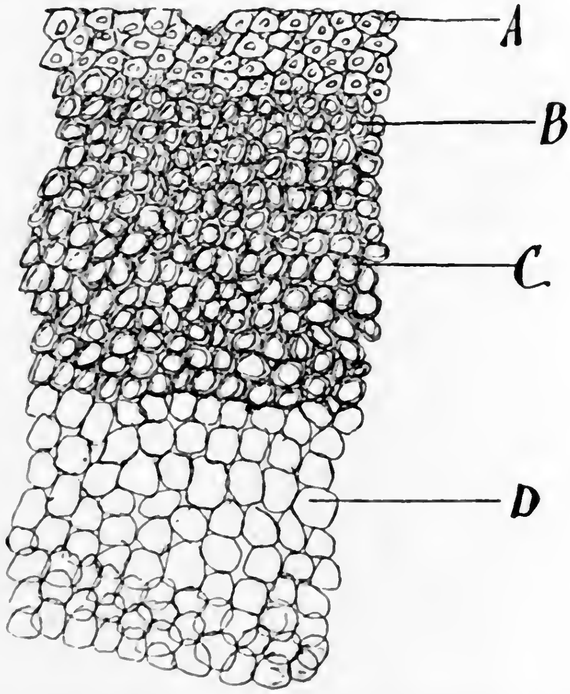


*Fig. 5*, portion of transverse section of fruit of Solanum Carolinense, showing the succulent tissues, magnified 200 diameters. *A*, epidermal tissue ; *b* and *c*, succulent tissues, farther interior ; *d*, parenchyma tissue, adjacent to the placenta.

bright red. The stem possesses open collateral bundles, which are in wedge-shaped rays, and which are separated from one an other by medullary rays. In the mature stem the outer portion of the section consists of several rows of cork tissue, which are exfoliating at the surface. In the mature stem indications of tannin are obtained in abundance in the pith parenchyma, medullary rays, cambium zone, phloem, cortical parenchyma and suberous tissue.

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*Artificial whalebone* is prepared from bones by removing fat, then treating with hydrochloric acid to extract lime ; the cartilaginous residue is then steeped in concentrated chrome alum solution until saturated. It is then dried and cut into strips for use.

# A CONTRIBUTION TO THE KNOWLEDGE OF SOME NORTH AMERICAN CONIFERÆ.

BY EDSON S. BASTIN AND HENRY TRIMBLE.

(*Continued from Vol. 68, page 648.*)

## TSUGA CANADENSIS.

### CHEMICAL COMPOSITION.

Considering the enormous commercial importance of this tree and its products, it has received very little attention by the botanist or chemist. No investigations have been reported recently, except two on the volatile oil, so that the text-books at the present time give the results of observations made from twenty-five to fifty years ago.

*The Leaves.*—The most important constituent of the leaves is the volatile oil. The preparation of this product was described by Stearns[1] in a report to the American Pharmaceutical Association in 1858. He had, from a practical distiller, the information that in Michigan, at least, the oils of hemlock and spruce (Picea nigra) were one and the same thing, and distilled from the boughs of Tsuga Canadensis, a statement which is probably true to-day.

"The proceeding is as follows: The trees are cut down and the boughs collected only; they are cut up fine and subjected to a distillation with water, in a portable copper still and worm, capable of holding about one hundred gallons, which is so arranged that it can be transported in the woods, and erected quickly upon a temporary arch; two pails full of boughs (about 8 pounds) are calculated to yield 1 ounce of oil. The distilling is done only in winter, when the tree is richest in oil."

Bertram and Walbaum,[2] in 1894, examined oil of spruce, said to have been prepared from Abies Canadensis (Tsuga Canadensis), and found it to consist of laevogyrate pinene, laevogyrate bornyl acetate (36 per cent.) and a sesquiterpene. It had a specific gravity of 0·907 at 15° C. Carl G. Hunkel[3] considered it a question whether this sample was derived from Tsuga Canadensis, or from Picea nigra; he, therefore, collected the leaves and twigs of Tsuga Canadensis himself in the month of September, and submitted them, while fresh, to distillation with water vapor. The yield was small, of a yellowish

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[1] Report on the Medical Plants of Michigan, AM. JOUR. PHARM. 1859, p. 28.

[2] *Archiv der Pharm.*, **231**, 294.

[3] *Pharmaceutical Review*, **14**, 34.

color and it possessed the characteristic odor of hemlock. The specific gravity of the dried oil at 20° C. was 0·9288, $[\alpha]_D = -$ 18·399° at the same temperature. His conclusion was that this oil of hemlock was very similar in composition to that examined by Bertram and Walbaum, and also to the oil of black spruce, Picea nigra, previously examined by himself.

Our own experiments on the leaves have been limited to an estimation of the tannin, resin and ash. For this work the leaves were collected in November, and, after a short exposure to dry air, were found to still contain 12·80 per cent. of moisture. The ash estimated on absolutely dry substance was found to be 3·78 per cent., and tannin, similarly calculated, amounted to 1·48 per cent. The ash contained calcium and potassium sulphates, phosphates and traces of carbonates and chlorides. The leaves submitted to the action of absolute alcohol yielded 22·97 per cent. of their weight to that solvent. From the residual extract, after recovery of the alcohol, petroleum ether removed 5·83 per cent. of the weight of the leaves, consisting of fat, volatile oil, wax, chlorophyll and resin. Water then removed from the residual alcohol extract 14·70 per cent. of the weight of the leaves, which consisted of tannin, sugar and extractive, leaving 2·44 per cent. of resinous matter and chlorophyll.

*The Root Bark.*—This portion of the hemlock was collected for examination on the first day of August, and yielded the following results:

| | Per Cent. |
|---|---|
| Moisture | 11·83 |
| Ash in dry bark | 3·96 |
| Tannin in dry bark | 24·46 |

This large amount of tannin was equivalent to 21·57 per cent. in the air-dry sample.

*The Trunk.*—The wood portion of the hemlock tree supplies the chief amount of the resin, which is found in commerce under the name of Canadian pitch.

Probably the first pharmaceutical literature concerning this resin was by Charles Ellis,[1] in 1830, and the full title of the paper, as

[1] "Pinus Canadensis, Willd.; Abies Canadensis, Mich. Sylv. A large tree belonging to the natural order Coniferæ, Monœcia, Monodelphia of Linnaeus. Officinal Resin Pini Canadensis. Hemlock Resin. By Charles Ellis." *Journal of the Philadelphia College of Pharmacy*, Vol. 2, p. 18.

given in the foot-note, indicates that the tree and its products were not well known at that time. The paper opens by stating this tree is "known only in the United States by the name of hemlock spruce, and in Canada by the French is called pèrusse." That the resin had not been an article of commerce very long is indicated by the following: "The resin which exudes from it was first introduced into this City (Philadelphia) about twelve years since, and was obtained in this State (Pennsylvania) near Silver Lake, Susquehanna County. But its history even here has been but little known, and still less elsewhere." That the wood of the hemlock was not much esteemed is evidenced by the statement that "of all the great resinous trees of America, its wood is of least value." The process of collecting the resin at that time was different from that given by more recent writers. Then it was prepared by boiling the bark with water and skimming off the melted resin as it rose to the surface. The quantity yielded by a single tree with this process was said to be from 4 to 6 pounds. The product was more or less contaminated with pieces of bark and was submitted to a process of purification by melting and straining.

A more recent report, by Stearns, in 1858, already referred to, gives the process of preparation as wholly from the wood, two methods for this purpose being employed, one by making cup-like incisions in the body of the living tree and allowing the resin to flow out, after the manner of collecting turpentine; the other, by chopping out the knots in the wood, which are rich in resin, and boiling them with water. The latter method is not considered as good as the former, as the boiling with water deprives the resin of most of its volatile oil, which is present in the resin obtained by exudation.

Canada pitch is considered to be equal, if not superior, to Burgundy pitch in the manufacture of plasters; but both have given way, in the modern methods, to caoutchouc and asphalt, chiefly the latter.

Very little is known of the chemistry of Canada pitch; the volatile oil contained in it is probably similar to that obtained from the leaves, and just described; but the resin or resins, which constitute a large proportion of it, have not been studied.

The bark of the trunk is, from both chemical and industrial standpoints, of great importance; nevertheless, there does not ap-

pear to have been published anything concerning its composition. It is evident that it contains resin, volatile oil and tannin, and a closer examination will show the presence of a considerable amount of red coloring, as has already been shown in the description of microscopical structure.

The following results were obtained by us on a sample of bark collected in June, 1896, in eastern Tennessee. The sample was taken from the trunk of a large tree, near the ground, and represents an average sample of the hemlock bark used in that district by tanners. The whole bark was taken; that is, it had not been "rossed." After having been finely powdered, 50 grammes were submitted successively to the following solvents, moisture and ash being added in the proportions they were found to exist in the air-dry drug:

| | Per Cent. |
|---|---|
| Petroleum ether dissolved | 0·70 |
| Ether " | 3·50 |
| Absolute alcohol " | 15·74 |
| Water " | 3·92 |
| Alkaline water " | 7·51 |
| Acid " " | 0·81 |
| Boiling " " | 1·47 |
| Ash in air-dry bark | 1·42 |
| Moisture in air-dry bark | 6·73 |
| Residue and undetermined | 58·20 |
| | 100·00 |

The petroleum ether extract consisted of 0·036 per cent. volatile oil, 0·564 per cent. of fat melting at 50°, and 0·10 per cent. of wax melting at 65°.

The ethereal extract consisted chiefly of resin and red coloring matter, with a small amount of tannin.

The alcohol extract contained 7·90 per cent. of resin and decomposed tannin, known as hemlock red, the balance being pure tannin, soluble in water.

The water extract contained neither mucilage, sugar nor tannin, and only a small amount of coloring matter; its composition was not further studied.

The alkali extract contained 2·29 per cent. of albuminoids, and the hot water extract consisted almost entirely of starch.

The ash was found to be composed of magnesium in greatest abundance, aluminum, calcium, manganese, potassium and traces of phosphoric, hydrochloric and sulphuric acids.

It will be seen from this analysis of the bark that the important constituents are tannin, resin and hemlock red; all of these constituents vary with the season of the year. Hemlock red may be an intermediate product between the resins and the tannin; its proportion in the bark is very variable.

### HEMLOCK TANNIN.

The tannin of hemlock bark has received so little attention at the hands of investigators, and is of so much importance industrially, that it is considered worthy of especial notice here.

*Occurrence.*—The few results that have been published concerning the amount of tannin in hemlock bark are widely at variance with one another. Procter[1] says it contains nearly 14 per cent.; he probably quoted Mulligan and Dowling,[2] who, in 1859, found 13·9 per cent. Mafat,[3] 1892, gives 8 to 10 per cent. as the average amount. The following results will show that there may be a great variation in the proportion present, according to the season of the year and other circumstances:

PERCENTAGES OF MOISTURE, ASH AND TANNIN IN THE BARK OF TSUGA CANADENSIS.

| Date of Collection. | Moisture. | Ash in Absolutely Dry Bark. | Tannin in Absolutely Dry Bark. | Remarks. | |
|---|---|---|---|---|---|
| May 12, 1895 . . . | 20·06 | 1·46 | 8·22 | Small tree. | Near Philadelphia. |
| June 30, 1895 . . . | 15·54 | 3·03 | 9·82 | Taken from a branch. | " " |
| August 1, 1895[1] . . | 10·00 | 2·51 | 14·77 | Small tree. Bark from trunk. | " " |
| October 27, 1895 . | 11·90 | 1·21 | 15·12 | " " " " " | " " |
| November 28, 1895 | 14·01 | 1·43 | 15·45 | Medium" " " " | " " |
| January 17, 1897 . | 13·45 | 1·58 | 13·05 | " " " " " | " " |
| May, 1896 . . . . | 10·73 | 1·56 | 10·60 | Large " " " " | Tennessee. |
| June, 1896 . . . . | 10·43 | 1·40 | 14·96 | " " " " " | " |
| July, 1896 . . . . | 10·98 | 1·29 | 11·34 | " " " " " | " |

[1] This sample was taken from the same tree that yielded the root bark, the composition of which ha been given on a previous page of this article.

Hemlock bark is usually collected during the months of May, June and July, and the three samples in the foregoing table which

[1] *Text-Book of Tanning*, p. 31.

[2] *Chemical Gazette*, 17, 430.

[3] *Bulletin de la Société industrielle de Mulhouse*, 62, 130. AM. JOUR. PHARM., 64, 531.

were collected in 1896 were taken from similar trees for the especial purpose of determining their relative tannin value.

*Preparation.*—For the purpose of investigating its composition and properties, a considerable quantity of the tannin was prepared by extracting hemlock bark with acetone. The solvent was recovered by distillation and the syrupy residue was poured into several times its bulk of water; the insoluble resin and anhydrides were separated by agitation with paper pulp and filtration. The clear aqueous liquid was saturated with sodium chloride and shaken with acetic ether, which removed the tannin,[1] the solvent in this case being removed by distillation under reduced pressure. The residue was redissolved in water, salt added and the tannin again removed by acetic ether, and the operation repeated until a tannin resulted which formed a clear solution with water. It was then treated with absolute ether, in which it was insoluble, and, after removal of the ether, dried.

*Properties and Composition.*—The product was a reddish porous powder, completely and readily soluble in water and in alcohol. A 1 per cent. solution gave the following reactions:

| Reagent. | Hemlock Tannin. | Chestnut Oak Tannin. | Gallotannic Acid. |
|---|---|---|---|
| Ferric chloride and | Brownish-green color and ppt. | Green color and ppt. | Blue color and ppt. |
| Ammonium hydrate. | Purple color and ppt. | Purple ppt. | Purple ppt. |
| Ammonio-ferric sulphate. | Brownish-green color and ppt. | Green color and ppt. | Blue color and ppt. |
| Calcium hydrate. | Pinkish ppt., turning red. | Precipitate turning pink. | Precipitate turning blue. |
| Bromine water. | Yellow ppt. | Yellow ppt. | No ppt. |

A study of the decomposition products of hemlock tannin was made in the usual way. The product resulting from the action of heat on a solution of the tannin in glycerin was identified as

[1] It has since been found that methyl acetate with salt answers the purpose of an immiscible solvent, for the removal of tannin, equally as well as ethyl acetate, and is much cheaper.

catechol. Boiling hydrochloric acid containing 2 per cent. of HCl gas, resolved the tannin into an amorphous, reddish-brown, insoluble phlobaphene and soluble protocatechuic acid. The phlobaphene was of the same character as that obtained from the tannins of several oak barks. When heated with fused potassium hydrate the tannin yielded protocatechuic acid. Although the above reactions and decomposition products indicated a great similarity between the tannins of the barks of the hemlock and oaks, an ultimate analysis was made in order to further establish their relationship. The results which were obtained show that the tannins from these two sources are very closely related, if, indeed, not identical. For comparison, the figures which represent the composition of chestnut oak bark tannin, gallotannic acid and the average composition of the tannins from nine species of oak bark are given :

| | Hemlock Tannin. | Chestnut Oak Tannin. | Average on Tannins from Nine Species of Oaks. | Gallotannic Acid. |
|---|---|---|---|---|
| Carbon | 60·09 | 59·69 | 59·79 | 52·17 |
| Hydrogen | 5·18 | 5·06 | 5·08 | 3·10 |
| Oxygen | 34·73 | 35·25 | 35·13 | 44·73 |
| | 100·00 | 100·00 | 100·00 | 100·00 |

The several tannins used in the combustions were dried at 120° C.

The conclusion from this study of the properties and composition of hemlock tannin is that it is identical with the other tannins of this natural order, which have thus far been studied by us, as well as with the tannin of oak bark, and a number of others from a variety of sources.

The only other investigation of hemlock tannin on record was made by Boettinger[1], in 1884, who, by precipitating a commercial extract of hemlock bark with bromine, and estimating the halogen in the product, deduced the formula $C_{20}H_{14}Br_4O_{10}$ from which he concluded that the tannin had a composition expressed by the formula $C_{20}H_{18}O_{10}$. Such a formula would require the following percentage composition :

| | |
|---|---|
| C | 57·41 |
| H | 4·31 |
| O | 38·28 |
| | 100·00 |

[1] *Berichte der deut. chem. Gesell.*, 17, 1041 and 1123.

This is a considerable variation from our figures given for hemlock tannin and, in fact, from those of a larger number of other tannins, and it appears reasonable to attribute this difference to the fact that Boettinger operated on a commercial extract of hemlock. To those familiar with the manufacture of tanning extracts this would be a sufficient reason for allowing his results to await further research on the bark. Much assistance on the chemical investigation of this tannin was given by J. C. Peacock and W. E. Ridenour, who also aided in the collection of the various samples used in the estimations.

## ECONOMICS.

When Ellis wrote concerning this tree in 1830, the wood was considered of very little value, but the steady diminution of our forests has brought this wood to the front, and it is now one of the most important lumber trees in northeastern United States. The hemlock trunks also found use before iron became so cheap, in conveying water. A case was reported in 1862[1], where pipes of this wood had been in service thirty-two years, and where the earth was moist they had not decayed. The resin has had extensive use in the manufacture of plasters, and is still employed for that purpose. The volatile oil from the branches is used as a flavoring and for disinfecting purposes. The bark is used to an enormous extent in the manufacture of heavy leather. In recent years, many tanneries have been built in the hemlock districts, so as to be near the supply of bark. For the finer grades of leather the hemlock bark is mixed with that of the oak, in order to avoid the reddish color produced by the former.

An extract of the bark is employed by tanners in place of the bark, or to strengthen their bark liquors, and in a variety of other ways, notably by dyers, in conjunction with logwood coloring, to modify the shades of the latter, especially when copper sulphate is used as the mordant. Large quantities of hemlock extract go to the European markets, where it finds ready sale. All parts of the tree are used except the root, and from what we have seen of its contents of tannin we may look forward to the day when it, too, will not be allowed to go to waste.

(*To be continued.*)

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[1] AM. JOUR. PHARM., 34, 377.

# CORRESPONDENCE ON THE MANUFACTURE OF SOME GALENICALS FROM FLUID EXTRACTS.

BY EDWARD R. SQUIBB, CHARLES RICE AND JOHN URI LLOYD.

BROOKLYN, N. Y., January 8, 1897.

*Mr. L. F. Kebler, Philadelphia.*

DEAR SIR:—Your favor of yesterday is received. I am not in a condition to enter upon this discussion, but must confine myself to my chief argument against the general practice of making tinctures from fluid extracts; and this single argument has been sufficient to control my practice ever since fluid extracts were introduced.

The objection to the practice is that it is not authorized by the U.S.P., and that, therefore, such tinctures are not officinal, but are substituted for the officinal tinctures.

To make them so is to break through our own authority, or law, as to how they should be made, and to substitute them for the U.S.P. tinctures is an immoral act of dangerous influence and example.

The convenience of such a practice has been known to the successive Committees of Revision ever since fluid extracts were admitted to the U.S.P., since the practice antedated the admission, and in some of the committees, at least, it was fully discussed and rejected by majority vote. A prominent reason for rejecting the practice was that it doubled the risks of quality in the tinctures so made, and pushed the responsibility for quality back from the dispenser to some one behind. If a dispenser makes a tincture from a drug, he is bound to know, and does know, whether it be the officinal drug or not, and responsibility for the quality of the tincture is direct and, therefore, right and proper. If he makes his tincture from a fluid extract, according to the formula of the fluid-extract maker, he goes entirely behind his only legitimate authority, the U.S.P., both for material and process, and supposes he avoids the responsibility for quality. If he says: "I buy standardized fluid extracts because they are better than unassayed drugs," he brings the practice to depend on the standardization, which is still further back from the legitimate responsibility, for then, who standardizes the standardizer, and who authorizes his assay process?

When the Pharmacopœia finds a set of assay processes simple

enough to be trusted for general use, it will probably direct some such practice. It has not done so yet, and until it does it is but right, and it is the part of wisdom and safety, to conform to its authority and obey its commands. Why sacrifice the advantages of having an excellent Pharmacopœia by trying to set up individual or popular authority against it. Change the law, if you will—but don't change the practice against the law.

I have no objection whatever to your using what I have said in your approaching discussion of the subject on the 20th. Indeed, I would very much like to have this letter read in the discussion at the Pharmaceutical Meeting on January 20th, and published in the Minutes of the College Meeting. Very truly yours,

E. R. Squibb.

New York, January 9, 1897.

*Lyman F. Kebler, Esq.*

My Dear Sir:—You ask me what my opinion is regarding the propriety of making tinctures and other liquid preparations from the corresponding fluid extracts, citing as an example the case of nux vomica, where the U.S.P. directs the tincture to be made from the assayed extract, and then raising the question why a tincture of aconite (35 per cent.) prepared from an assayed fluid extract should be less reliable than one made direct from the drug of unknown strength.

In compliance with your request, I submit the following, which you are at liberty to use, as coming from me, in any way agreeable to you:

When fluid extracts were first suggested and introduced, the principal claim made for them was that they represented the corresponding tinctures, wines, etc., in a more concentrated form and in a smaller bulk. No one claimed for them a different therapeutic action, except, of course, that a proportionately smaller quantity of them was required to produce the same effect as a corresponding dose of the respective tinctures. No authority in therapeutics to this day has maintained that tinctures and fluid extracts prepared from the same drug differed by more than the degree of effect, except, perhaps, in a few cases, and then for reasons well understood.

Now, if a tincture or a fluid extract is properly made from the same, uniformly mixed and comminuted lot of a drug, either of them

should and will contain all the desired active principles of the drug. If this is true, it follows logically and necessarily that if such a fluid extract be diluted by the proper menstruum to the strength of the corresponding tincture, the resulting dilution will be equal in therapeutic effect to the latter. But one reservation must be made here. The equality will be disturbed, if the liquid added as diluent to the fluid extract causes such a disturbance of the dissolved matters that some of the latter, either at once or gradually, lose their solubility and become precipitated. That there are drugs behaving in such a manner cannot be denied, and it must, at the same time, be stated that, while the matters first thrown out of solution are probably, *in themselves*, always inert, yet they are apt to carry along with them some of the useful, active constituents, thereby causing the tincture made by dilution from the fluid extract to become weaker in therapeutic strength than that made originally as a tincture from the drug direct. Moreover, it is well known that when such precipitation once begins, it is liable to progress for a long time, so that even filtration will not interrupt the process of deterioration. A notable example of this class of drugs is cinchona bark, particularly the red variety.

If the statements thus far made are agreed to, it seems to me that we may formulate a few propositions regarding the subject, which will probably also be accepted, though there is likely to arise a difference of opinion as to whether it is practicable at all, or at least as to how far it is practicable to apply the propositions. It should be understood that in comparing any fluid extract and tincture made from one and the same drug, they are assumed to have been prepared from known quantities of the drug of known strength, and, therefore, to be commensurate. The propositions which I wish to make are as follows:

(1) If a fluid extract differs from a tincture only in the quantity of the solvent or menstruum, and if the dilution of the former to the strength of the tincture by the addition of more of the solvent throws nothing out of solution, the two tinctures must be alike in the quantity of active constituents, and, therefore, be alike in therapeutic effect.

(2) If the dilution of a fluid extract to the strength of the corresponding tincture by the addition of even the most favorable menstruum causes a precipitation, the two tinctures may still be re-

garded as alike in therapeutic effect, if the precipitate contains none of the useful medicinal constituents.

These propositions are almost self-evident, and will probably not be gainsaid. But it is a well-known fact that, in many cases, the dilution of a fluid extract produces, sooner or later, more or less precipitation. And as it is not at all practicable to classify drugs into groups representing such as will or will not yield precipitable fluid extracts, though it is possible to *mention* some from which no precipitate is derived, it seems to me unwise to give a general endorsement to the practice of preparing tinctures from fluid extracts, at least at the present time, and in the present state of our knowledge. If the manufacturing houses could put on the market fluid extracts of full official strength, made with menstrua, the further addition of which would cause no precipitate, or at most only one known or guaranteed to be inert, the practice might be approved. But as this is not the case, nor likely to happen in the near future, no general license to make tinctures from fluid extracts should be given. On the other hand, if a pharmacist has the knowledge and ability to examine and assay his preparations, and is willing to assume full responsibility for the quality of the medicines he dispenses, he should have full liberty as to how he arrives at any preparation, say at a tincture, and it is then immaterial whether he prepares it from the fluid extract or the drug. I would, therefore, offer as a third proposition the following:

(3) The practice of preparing tinctures from fluid extracts, in all cases where dilution causes obvious physical changes (such as precipitation, gelatinization, etc.), is not to be recommended for general use, but may be adopted in cases of necessity or urgency, when a prescription calls for the tincture of a drug of which only the fluid extract is available or obtainable.

Now as to the labels you sent me. To judge from experience, I should say that no trouble will be encountered in preparing a tincture from the fluid extracts of aconite and ipecac. But it is probable that some precipitate will form in the case of belladonna leaves and coca leaves, particularly as different persons are apt to use different menstrua, in spite of your direction. Still, we should not pay any attention to what may happen if your directions are disobeyed. If it can be shown that the precipitate in these cases is free from alkaloids, there can be no objection raised against the method.

I have been more profuse than I intended; but I do not regret it now, since it gave me a chance to discuss a subject which has often been brought to my notice. Very truly yours,

CHARLES RICE.

CINCINNATI, O., January 9, 1897.

MY DEAR MR. KEBLER:—Permit me to strongly urge you *not* to commit yourself without reserve to the tincture-from-fluid-extract method. In my opinion there is more than one side to the subject. In the case of preparations in which the therapeutical constituent or constituents of the drug are firmly established and known, and in which no question exists concerning the exact value of the fluid extract, there seems to me to be no question but that the tincture may be made by diluting the fluid extract; this, of course, being in cases where the menstruum will not be considered at all as a therapeutical part of the product.

In such cases as nux vomica, where the therapeutical constituents are permanent, I will go further, and say that, owing to the difficulty of extraction, in my opinion, unless the tincture is assayed in order to establish its value, the method of preparation from an unexceptional fluid extract (standardized) is to be preferred to blind extractions from a standardized drug.

In some cases, however, as, for example, ipecac, I question if it has been demonstrated that a standardized fluid extract will retain its therapeutical value as fully as will the drug. Indeed, I am of the opinion that the advantage is decidedly with the drug. Hence, in such cases as this, which might be illustrated more markedly, perhaps, with other drugs, the element of time may play an important part in the subject

On the other hand, with drugs that deteriorate more rapidly than a bottled preparation made promptly from the drug when in its best condition, the *preference* must, in my opinion, rest with the fluid extract. Among these may be cited those substances containing volatile bodies that escape by age; as, for example, pennyroyal, peppermint, etc. (of course, the fluid must carry full amount of tannates, etc.), and included in this class must be such substances as disintegrate on exposure in drug form, as exemplified in pulsatilla, arum, etc.

Passing now to the great class of drugs in which nothing has been

recorded as to the therapeutical constituents, and in which the menstruum employed in making the official tincture is different from that used in making the fluid extract, in my opinion the question is open yet, and I hardly venture to express a view for or against. Indeed, I would prefer to place these among EMERGENCY preparations, in which, in cases demanding prompt action, the making of a tincture from the fluid extract is permitted, but in which the general stock should be made, as yet, from the drug.

Among the preparations where tinctures may be made, I would include all these fluid extracts *not official* and of which no standard menstruum exists for making either the tincture or fluid extract. These the pharmacist should be permitted (expected) to mix from the respective fluid extract when he has a call for the tincture.

Finally, in cases where the menstruum directed by the U.S.P. is decidedly different from that used in making the fluid extract, especially in those cases where the tincture is given in large doses and in which the alcoholic strength of the tincture is very much less than that of the fluid extract, the question of therapy extends beyond the drug question. If the fluid extract is mixed with the official menstruum, an unscientific product results; if it be not mixed with the tincture menstruum, the superabundance of alcohol may prove objectionable. In these cases, until the U.S.P. is corrected and identical solvents used in making both tincture and fluid extract (which, in my opinion, should be accomplished, and with few exceptions can easily be done), the making of the tincture from the fluid extract should be avoided, unless an emergency case renders it absolutely necessary, which now and then will be the case.

In my opinion this subject is one worthy of some study and consideration. I see no reason why manufacturers of fluid extracts should not give directions for making tinctures from fluid extracts; but, in my opinion, although such information is useful in emergency cases, and in certain cases to be *preferred*, I would not advocate the substitution of a line of tinctures made in this way without Pharmacopœial authority. I feel that the skill required in making these simplest of pharmaceutical preparations is not such as to prevent their preparation from the drugs, and I believe it is the duty of the Pharmacist to make them according to the Pharmacopœia, until the Pharmacopœia gives him the privilege of selecting either method. This, I believe, in face of the fact that in my opinion cer-

tain tinctures can in a general way be made as reasonably (or even cheaper) from the fluid extract, and with greater uniformity than from the drug. Of course, you are at liberty to use this letter in your society if my personal opinion will be of service. Bear in mind that the subject is considered in a rambling way and superficially, but still it voices opinions gained by more than a little thought in this direction. Very sincerely yours,

JOHN URI LLOYD.

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## PURE SPERMACETI.

By LYMAN F. KEBLER.

About a year ago, the writer presented[1] some data on the question of spermaceti. The conclusions arrived at then raised a question concerning the absolute purity of the material operated on. While it was impossible to state that the spermaceti was absolutely pure, yet there was every reason to think that such was the case. In order to settle the question as completely as possible, specimens of spermaceti were secured as close to the natural source as the nature of the case permitted. To bring this about most effectually, every person who was likely to be in a position to secure a sample of pure material was interviewed, either personally or through correspondence. The original producers were also requested to furnish samples that they were willing to guarantee absolutely pure. This they cheerfully did.

By the above procedure, three specimens were received from the Pacific Coast, through the kindness of Prof. W. R. Searby, of San Francisco, Cal. Prof. E. L. Patch, kindly secured a sample himself at New Bedford, Mass. Profs. J. P. Remington and W. R. Scoville each obtained a sample from the same source, through friends closely connected with the spermaceti trade there. The writer himself secured five samples from the original producers, with guarantees of absolute purity. Dr. Chas. Rice also assisted in the way of suggestions. No. 12 was a specimen obtained by melting together several samples taken from a purchase of 2,000 pounds. These specimens, coming directly from the centres of supply of the United States, can reasonably be expected to be pure, at least purer material cannot be secured in this country.

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[1] 1896, AM. JOUR. PHARM., 68, 7.

Having accumulated the samples, they were carefully examined. Physically, they resembled one another very closely, and did not differ in any respect from the commercial material examined during the past three years. They were all tested in the same manner that those reported on last year were; in addition, however, the specific gravity was taken in a liquid lighter than the spermaceti, by means of the sinker attached, and at the boiling point of water in a pycnometer. Two methods for attaching the sinker were employed. In the first case, the sinker was simply tied to the spermaceti; in the second case, the sinker covered the spermaceti so that only one surface was exposed to the liquid, thus reducing the question of attached air-bubbles to a minimum. This was done in the following manner: Porcelain crucible covers were carefully cleansed, dried and their weight taken. The melted spermaceti was poured into these covers, allowed to cool at the temperature of the working-room and the specific gravity taken at the end of two days with the spermaceti *in situ*. The congealing points were also observed. The results are as follows:

| Persons Secured Samples. | Melting Point, C. | Congealing Point, C. | Acid Number. | Ether Number. | Specific Gravity at 98°–99° C. Water at 98°–99° C. | Specific Gravity at 98°–99° C. Water at 15° C. | Specific Gravity at 15° C., in Alcohol. | Specific Gravity at 15° C., Sinker Attached. | Specific Gravity at 15° C., Spermaceti in Sinker. | Specific Gravity at 15° C. by Suspensory Method. |
|---|---|---|---|---|---|---|---|---|---|---|
| Remington . . | 43·5° | 42° | 0·47 | 129 62 | 0 8406 | 0·8083 | 0·8981 | 0·8979 | 0·8902 | 0·9381 |
| Scoville . . . | 44·5° | 43° | 0·10 | 125· | 0·8405 | 0·8083 | 0·8989 | 0·8992 | 0·8987 | 0·9385 |
| Patch . . . . | 45° | 43° | 0·25 | 124·8 | 0·8404 | 0·8082 | 0·9042 | 0·9009 | 0·9036 | 0·9401 |
| Searby . . . . | 44° | 42·5° | 0·21 | 131·06 | 0·8458* | 0·8124 | 0·9066 | 0·9007 | 0·8954 | 0·9510 |
| Searby . . . . | 43° | 42° | 0·16 | 136·31 | 0·8432 | 0 8109 | 0·8960 | 0·9099 | 0·8118 | 0·9413 |
| Searby . . . . | 43·5° | 42° | 0·43 | 129·91 | 0·8432 | 0·8160 | 0·8969 | 0·9000 | 0·9009 | 0·9420 |
| Kebler . . . . | 44° | 43° | 0·30 | 130·30 | 0·8412 | 0·8089 | 0·8960 | 0·8972 | 0·8993 | 0·9394 |
| Kebler . . . . | 43° | 42° | 0·35 | 130·20 | 0·8412 | 0·8089 | 0·8899 | 0·8974 | 0·8937 | 0·9400 |
| Kebler . . . . | 44° | 43° | 0·23 | 125·81 | 0·8410 | 0.8087 | 0·8982 | 0·8983 | 0·8982 | 0·9421 |
| Kebler . . . . | 46° | 44·5° | 0·19 | 129·02 | 0·8412 | 0·8089 | 0·9079 | 0 9079 | 0·9013 | 0·9410 |
| Kebler . . . . | 44·5° | 43° | 0·29 | 128·13 | 0·8419 | 0·8097 | 0·9103 | 0·9018 | 0·8992 | 0·9500 |
| Commercial . | 44° | 43° | 0·09 | 125·1 | 0·8409 | 0·8093 | 0·8991 | 0·8993 | 0·9010 | 0·9400 |

The melting-points, acid numbers and ether numbers correspond very closely with those reported last year. The anomalous specific gravities are unique and require an explanation. The highest specific gravities were obtained by the same method that was used to ascertain the specific gravities reported on in a previous paper, viz.: alcohol diluted to such an extent that the small pellets floated indifferently. This method, for convenience, will be called the *suspensory method.*

In making the pellets for the suspensory method, the melted (on a water-bath) spermaceti was dropped on a moistened plate having a temperature of about 20° C. This was cool enough to chill the melted spermaceti quickly, so that the molecules were not given time to assume a crystalline form; at least, the pellets were very slightly crystalline, if at all.

For the other methods in which the solid material was employed, the melted spermaceti was poured into porcelain crucible covers and allowed to cool in a room at about 22° C. After cooling, the spermaceti was removed from the covers. All material worked on was given at least two days' time to assume a normal state before the specific gravity was taken. These prepared forms were 30 mm. in diameter and about 6 mm. thick; thicker in the centre, tapering towards the circumference. The manner of congealing allowed ample time for the spermaceti to assume crystalline forms.

Normally, spermaceti is crystalline. From the fact that the pellets prepared for the suspensory method were non-crystalline, and of a higher specific gravity than the crystallized material, the writer is led to think that the specific gravity for normal spermaceti is not much above 0·9000 and not much below 0·8900 at 15° C. The specific gravity obtained by the suspensory method is probably abnormal, due to the non-crystalline character of the pellets.

The writer, on referring to his memorandum, finds that the low specific gravities obtained by the suspensory method, reported in a former contribution (0·905, 0·915, 0·920, etc.), were taken during the months of August and early September; while the higher specific gravities (0·935, 0·939, etc.) were taken in November and December.

In the former case the elevated temperature was conducive to the formation of more highly crystalline pellets than in the latter case, when the temperature was considerably lower. The specific

gravities embodied in the present paper were all taken during the cold weather of December, 1896.

To throw further light on this point, further observations were made. The writer has in his possession a sample of crude sperm oil; on cooling, spermaceti crystallizes out and floats indifferently on the liquid at about 22° C.; the specific gravity of this mixture at 22° C. is 0·8846, which would approximate 0·8900 very closely at 15° C. Next, a sample of spermaceti, having a specific gravity of 0 9385 at 15° C. by the suspensory method, was dissolved with 20 per cent. of paraffin, having a specific gravity of 0·9132 at 15° C. by the same method. This mixture possessed a specific gravity of 0 945 by the same method. The same spermaceti, with an admixture of 33 per cent. of paraffin, had a specific gravity of 0·946 at 15° C. by the suspensory method. The experiments again indicate that the conclusion arrived at above is correct.

In view of the possibility of obtaining such variable results for the specific gravity of solid spermaceti it is necessary to detail exactly the conditions under which the observations are made, or the results are worthless.

The writer recommends that the specific gravity of this substance be taken at the boiling point of water. The results by this process are uniform and concordant. This is done as follows: Pour the melted spermaceti into the warmed pycnometer, insert the stopple and plunge the bottle immediately into boiling water, to such a depth that the neck of the bottle only projects. Keep the water boiling for one hour, remove the bottle, wipe well, cool and weigh. This gives the weight of a given volume of spermaceti at the temperature of boiling water.

The conclusions arrived at in the previous article are fully supported by the observations made in this communication, except the specific gravity of the solid material. To this constant a greater degree of variableness must be ascribed, depending entirely on the crystalline or non-crystalline condition of the spermaceti operated on.

Before closing the writer desires to kindly thank all who assisted him with this work.

305 Cherry Street, Philadelphia, Pa.

## SOLNINE NOTE.

By John Uri Lloyd.

The *American Journal of Pharmacy*, April, 1894, contained a paper from my pen concerning the alkaloid of *Solanum Carolinense*. To this alkaloid I ventured to affix the name *Solnine*, "in order to give it an existence in literature." I also stated that "having never made a study of *Solanine*, I am not prepared to decide concerning the identity of *Solnine* and that substance. If Wittstein's description of *Solanine* is correct, they are different." Afterward (September, 1895) a determination was accurately made of the melting point of crystallized solnine. This, together with the characteristics noted in the paper of April, 1895, may be said to fairly establish that Solnine is not the same as Solanine.

Melting point of Solnine . . . . . . . . . . . . . . . . . . 127·2° C.
Melting point of Solanine (as per current literature) . . . . 235·0° C.

A fresh supply of Solnine is now in process, and then I hope to supply combustion figures.

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## PILOCARPINE HYDROCHLORIDE.[1]

By Dr. B. H. Paul and A. J. Cownley.

In the last issue of the Pharmacopœia of the United States of America an addition was made to the characters of this salt by giving the melting point as 197° C., and an American journal has recently expressed the opinion that an observation of the melting point is the best means of ascertaining the purity of the salt met with in commerce. It might therefore be inferred that the hydrochloride has in that respect an advantage over the nitrate, some samples of which we have shown differ considerably in the melting point. The question, however, is not so much as to the purity of any particular salt, but whether the alkaloid obtained from jaborandi consists of more than one chemical individual. The results already described by us[2] point to the probability that the salts met with in commerce under the name of pilocarpine nitrate do contain more than one base, and there is consequently some uncertainty as to which of those bases has the medicinal action peculiar to jaborandi.

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[1] *Pharmaceutical Journal*, November 21, 1896.

[2] *Pharm. Jour.*, 1896, p. 1. Am. Jour. Pharm., 1896, p. 445.

A similar want of homogeneity might be expected to obtain with the hydrochloride and other pilocarpine salts.

In examining some samples of pilocarpine hydrochloride as to the melting point, we have found that this salt gives indications of being a mixture of more than one chemical compound. Taking the melting point in a Roth apparatus, we found that two different temperatures might be read as the melting point, one at which the substance in the capillary tube showed signs of partial liquefaction, and a higher point, at which the contents of the tube became entirely liquid. The results obtained with two samples of pilocarpine hydrochloride are given in the following table:

| Sample. | Began to Run. | Clear Liquid. |
|---|---|---|
| A | 192·7° | 196·7° |
| B | 192·2° | 196·7° |

This behavior appears to point to the probable presence of two substances in both of the samples, judging from the partial melting at the lower temperature, and the way the salt becomes a clear liquid at a point about 4° higher.

For one of these samples of pilocarpine hydrochloride we are indebted to Messrs. Domeier, who were good enough to procure it specially from the makers, Messrs. C. F. Boehringer & Sons. At the same time they sent an account of the result of some pharmacological examinations they have had made in consequence of the statement as to abnormal action of pilocarpine salts.[1] They have found that a salt of high melting does not differ in its action from the one of low melting point which can be separated by purification—presumably fractional recrystallization. In regard to the medicinal use of pilocarpine salts, this result would appear to show that the possible presence of two substances is, from that point of view, a matter of no account; but, at the same time, it would do away with the value of the melting-point test as a criterion of the qualities of pilocarpine salts.

In reference to the abnormal action of pilocarpine salts analogous to that of atropine, Messrs. Boehringer suggest that it may probably be due to the presence of jaborine; but as the existence of that base is somewhat questionable, such a mode of explanation would require to be supported by more definite proof than is at present available.

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[1] *Ibid.*, p. 2.

# RECENT LITERATURE RELATING TO PHARMACY.

## NOTES ON THE TREES YIELDING MYRRH.

E. M. Holmes read an interesting paper on this subject at an evening meeting of the Pharmaceutical Society, of Great Britain (*Pharmaceutical Journal*, December 12, 1896), in which he detailed his own investigations and at the same time incorporated some literature on this subject, which appeared in the *Kew Bulletin* for March and April, 1896.

Myrrh is imported into England chiefly from Aden, to which port it is sent from Arabia and Abyssinia. Some comes from Bombay, and is known in the London market as "red Zanzibar" myrrh. Writers on materia medica distinguish four varieties: Somali myrrh; Arabian myrrh, of Hanbury; Arabian myrrh, of Dymock, or Meetiya, and Yemen myrrh. There are also three others mentioned in *Pharmacographia Indica*, I, p. 307, as occurring in the Bombay market: Persian myrrh, sent principally from Mekran, Chinese myrrh and Siam myrrh or Meetiya; the same authority states that myrrh appears to have been shipped from China as early as A. D. 1340.

Judging from the taste and odor of the four principal varieties of myrrh mentioned above, it might reasonably be supposed that they are the product of one species of Commiphora, or of varieties of the same species modified by conditions of soil, elevation and climate.

Concerning the plant which yields Somali myrrh, we have no exact information, for there exists very little evidence connecting the gum resin with the trees supposed to yield, owing partly to the fact that collectors of plants are not usually well acquainted with the drugs of commerce.

With respect to Arabian myrrh the case is different. About the year 1820, Ehrenberg collected specimens of a myrrh tree at Gezan, in South Arabia. These were referred to Balsamodendron myrrha, Nees. Subsequently, however, Berg showed that two species were mixed under this name, and he separated the second, which has obcordate leaflets, under the name of B. Ehrenbergiana, Berg. The first of these, Balsamodendron, or, as it is now called, Commiphora myrrha, has recently been stated by Schweinfurth to yield no resin at all, and the second has been identified as a variety of the Balm of

Gilead tree, C. opobalsamum. Professor Schweinfurth has recently stated that Arabian myrrh is the product of Commiphora Abyssinica, Engl., and of C. schimperi (*Berichte der Pharm. Gesellschaft*, 1893, pp. 218 and 237), but the Director of Kew Gardens, in a lengthy paper on the subject in the *Kew Bulletin*, 1896, p. 91, in which he differs somewhat from the views of Professor Schweinfurth, expresses the opinion that Commiphora simplicifolia may be accepted as the source of Yemen myrrh, and that Fadhli myrrh be yielded by both C. myrrha and C. simplicifolia.

Professor Schweinfurth supplied the herbarium of the Pharmaceutical Society with specimens of C. Abyssinica, C. schimperi, C. simplicifolia, C. Africana and C. opobalsamum, and it occurred to Mr. Holmes that some light might be thrown on this difficult question by tasting the bark and fruits of these specimens, especially as true myrrh has a very bitter taste, and a peculiar aroma, hardly likely to be entirely absent in the plant itself. In none of these did Mr. Holmes detect the odor and taste of myrrh, and he says we are driven to the conclusion that Arabian myrrh is the produce of the plant named Balsamodendron myrrha, by Nees, and not of C. Abyssinica, nor of C. simplicifolia, nor of C. schimperi. There are several acrid gum resins that occur mixed with myrrh as imported. The most abundant of these is opaque bdellium, which, as pointed out by R. H. Parker (*Pharm. Jour.* [3], **11**, p. 41), differs from hotai in its greater toughness, and in giving an intense greenish-black color with ferric chloride. These are, doubtless, yielded by other species of Commiphora. Thirty-five species of Commiphora are described in A. DeCandolle's *Monographiæ Phanerogamarum Prodromi*, Vol. 4, pp. 9–29.

### RELATION OF THE GROWTH OF FOLIAGE LEAVES AND THE CHLOROPHYLL FUNCTION.

The following conclusions have been reached by D. T. MacDougal (*The Journal of the Linnean Society*, **31**, 526), after a practical study of a number of plants:

(1) Material constructed in active chlorophyll areas and stored in special organs may be transported to inactive chlorophyll-bearing organs in some plants in light and in darkness, and be used in such manner as to allow of the perfect development of these organs.

(2) The removal of concurrent members in darkness may have

no effect, may cause an exaggerated development of the petioles, or may result in the perfect development of the entire leaf. The nature of the regulatory mechanism in each instance must be entirely specific.

(3) It is possible for some plants to form perfect leaves in darkness, some when a portion of the stem only is darkened, and others when the entire plant is etiolated. It is thus shown that no invariable connection exists between the phototonic condition and leaf-development.

(4) The conclusion of Jost, that pathological conditions ensue more quickly in inactive leaves in light than in darkness, is not capable of general application. The deterioration in certain plants appears as quickly in darkness as in others in light.

(5) Placing a leaf under such conditions that it cannot construct food material, sets in motion the specific regulatory mechanism of the organism in such manner that the plastic material may be withdrawn and the organ cast off. An exaggerated development of the petioles may be induced in darkness by this mechanism.

(6) It is to be noted that plants may not be entirely ? as to their reaction to an atmosphere devoid of $CO_2$ upon the basis of species, since a given plant may be capable of developing inactive leaves at one stage of its development, and not at another. This is evident upon consideration of the fact that such capacity is entirely dependent upon the availability of the reserve food for this purpose.

In addition to this summary, the article contains an interesting historical introduction and a short bibliography of the subject.

## ORANGE GROVES OF NAPLES.

*The Orange Groves of Naples* are planted with wild trees, which are grafted in the usual way, and grow with bare trunks to 4 or 5 feet from the ground. The branches then run out and form the fruit-bearing portion of the tree. An ingenious and beautiful innovation has been introduced into one grove, and is described by Consul Neville-Rolfe in his latest report. Lemons are grafted upon the bare and non-productive stems of the oranges, about 2 feet from the ground, and trained in garlands from tree to tree, thus not only increasing the productiveness of the grove very materially, but adding greatly to the picturesqueness of its appearance. Orange trees being usually planted in rows at a measured distance apart, a

grove has usually a geometrical appearance which is unsatisfactory, but this appearance is very much modified by the lemons, which break the lines in all directions. There is a legend which most people firmly believe, that the grafting of a second fruit on the parent stem materially alters the type and quality, not only of the original fruit, but also of the graft, and it is sometimes gravely asserted that "blood oranges" are obtained by grafting the pomegranate on to the orange. This, says the Consul, is a complete fallacy. Both fruits retain their original quality, and neither borrows anything from the other. There is thus no difference between the lemons grown in the orange grove from those grown in the grove where lemons alone are cultivated.—*Pharmaceutical Journal, October 17, 1896.*

DETERMINATION OF THEOBROMINE IN CACAO. (Eminger, in *Forschungsberichte*, 1896, 275.)

The author first extracts vegetable fat by digesting 10 grammes of the finely powdered material with 150 parts of petroleum spirit; the residue is then dried and a weighed portion boiled for about half an hour, or until the formation of cacao-red is completed, with 100 cubic centimetres of dilute sulphuric acid (3–4 per cent.) in a flask fitted with a reflux condenser. The contents of the flask are then turned into a beaker and, whilst hot, exactly neutralized with the calculated quantity of baryta; the whole is evaporated to dryness with some sand, and the residue extracted in a Soxhlet apparatus with 150 parts of chloroform for five hours; the chloroform is then distilled off and the residue dried at 100° C. This residue is then washed with not more than 100 cubic centimetres of carbon tetrachloride, which dissolves the fat and caffeine; the theobromine, being quite insoluble in carbon tetrachloride at 18° C., is collected on a filter, dissolved in boiling water, the solution filtered and evaporated and the residue weighed. By this method the theobromine in different kinds of cacao was found to vary from 1·05 to 2·34 per cent., and the caffeine, from 0·05 to 0·36 per cent. Theobromine is soluble in 736·5 parts of water at 18° C., in 136 parts at 100° C., in 818 parts of boiling absolute alcohol, in 21,000 parts of ether at 17° C., in 2,710 parts of boiling chloroform, and in 5,808 parts at 18° C. "Theobromine begins to sublime at 220° C. without melting, whilst caffeine sublimes at 180° C. and begins to melt at 220° C." Theobromine is more or less decomposed if

warmed for any length of time with alkalies, earthy oxides or hydrated lead oxide.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

ANALYSIS OF CHLOROFORM. (*Gay, in J. Pharm. Chim., 1896, 4, 259.*)

(1) A piece of filter paper saturated with the chloroform should dry completely, and the odor remain pleasant to the end. The contrary indicates the presence of amyl alcohol.

(2) Shake 6 c.c. with 3 c.c. of water and test with litmus paper; this should not be reddened.

(3) Shake with an equal volume of 10 per cent. silver nitrate; a white precipitate on standing indicates the presence of hydrochloric acid, and a black precipitate on boiling, that of aldehyde or acetone.

(4) To 5 c.c. add 2 c.c. of a solution of 1 part of potassium bichromate in 100 parts of strong sulphuric acid, and warm gently; if alcohol be present a green coloration appears. A quantitative test for alcohol is necessary, since 0·5 per cent. may be added to preserve the chloroform. To 5 c.c. add 1 c.c. of Mohr's solution (1 part of potassium permanganate and 10 parts of alcoholic potash dissolved in 25 parts of water) in such a manner that the liquids do not mix; then shake whilst slowly turning the tube, and observe the time between the mixture and the appearance of a green color.

| | | |
|---|---|---|
| Time: | 5 minutes | Very pure chloroform. |
| " | 2·5 " | 0·01 per cent. alcohol. |
| " | 3·5 seconds | 0·1 " " |
| " | 5 " | 0·5 " " |
| " | Less than 5 seconds | more than 0·5 " " |
| One agitation | | 1·0 " " |

(5) Shake violently 10 c.c. with an equal volume of strong sulphuric acid and let stand. The mixture remains colorless, even for an hour, if the product is pure, but if it becomes brown, the presence of chloro-derivatives of ethyl alcohol or of the higher homologues is indicated.—*The Journal of the Society of Chemical Industry, October 31, 1896.*

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The quantity of quicksilver exported by the mines of Auerbach & Co., at Nikotovka, Russia, in the course of last year, amounted to 10,706 bottles, which went to various European countries, China, India and to the Transvaal. For consumption in Russia 1,596 bottles were sold. The output is steadily increasing.—*Chemist and Druggist,* December 5, 1896.

# EDITORIAL.

## MINERAL STATISTICS FOR 1896.

The *Engineering and Mining Journal*, of New York, in its issue of January 2, 1897, presents the statistics of the mineral and metal production of the United States for the year 1896. These statistics are gathered from official sources, or from reports of producers, and will be found to be very close to those which are made up later in detail. From these statistics we glean some facts of interest to pharmacists.

| Non-Metallic Products. | 1895. | | 1896. | |
|---|---|---|---|---|
| | Metric Tons. | Value. | Metric Tons. | Value. |
| Alum | 68,025 | $2,225,000 | 72,900 | $2,225,000 |
| Bromine | 179 | 102,662 | 249·5 | 143,074 |
| Borax | 6,126 | 742,850 | 6,886 | 759,094 |
| Copperas | 12,805 | 69,846 | 10,796 | 53,112 |
| Copper sulphate | 20,412 | 1,350,000 | 20,412 | 1,350,000 |
| Gypsum | 270,804 | 974,219 | 241,900 | 867,071 |
| Petroleum, crude | 6,420,742 | 42,547,701 | 5,731,920 | 42,116,184 |
| Salt, evaporated | 1,539,178 | 5,844,348 | 1,391,349 | 5,432,105 |
| Salt, rock | 173,662 | 518,740 | 146,998 | 138,840 |
| Soda, natural | 1,724 | 47,500 | — | — |
| Soda, manufactured | 167,000 | 3,841,000 | — | 3,500,000 |
| Sulphur | 1,676 | 126,950 | 1,524 | 100,000 |
| *Metals.* | | | | |
| Aluminum | 408 | 495,000 | 589·3 | 520,000 |
| Antimony | 393 | 68,847 | 579 | 83,440 |
| Copper | 175,294 | 36,944,988 | 205,853 | 48,786,080 |
| Gold | 70,470 kilos. | 46,830,200 | 85,773 kilos. | 57,000,000 |
| Iron, pig | 9,597,449 | 108,632,542 | 8,909,000 | 87,688,690 |
| Lead (New York value) | 142,298 | 10,132,768 | 159,410 | 10,472,733 |
| Platinum | 150 ozs. | 2,250 | 150 ozs. | 2,250 |
| Quicksilver | 1,179 | 1,313,589 | 1,160 | 1,222,444 |
| Silver (commercial value) | 1,441,087 k. | 30,254,087 | 1,414,148 | 30,461,665 |
| Zinc (spelter) | 74 245 | 5,942,890 | 74,925 | 6,074,219 |

S. P. S.

## FIELD BOTANY IN WINTER.

The *Pharmaceutical Journal*, in its issue of January 2, 1897, says the wild flowers most likely to be found in blossom in England during the early part of January are Capsella Bursa-pastoris, Ulex Europæus and Senecio vulgaris. This leads us to speak of the winter-blooming plants in the United States, where in the latitude of Philadelphia one does not need to await the arrival of spring to pursue outdoor botanical studies, since there is probably no month in the year in which plants cannot be found in bloom in this latitude. It is also of peculiar interest to observe the winter habits of a great number of plants, even if they are not in flower.

A walk of four or five miles in the vicinity of Philadelphia, on November 26, 1896, revealed the following eighteen plants in bloom; they were not unusually protected, although many of them were found on banks having a southern exposure: Sisymbrium officinale, Lepidium virginicum, Stellaria media, Cerastium viscosum, Malva rotundifolia, Trifolium pratense, Daucus carota, Solidago serotina, S. nemoralis, S. rugosa, Taraxacum officinale,

Chrysanthemum leucanthemum, Aster ericoides, A. cordifolius, Antennaria plantaginifolia, Gnaphalium polycephalum, Erigeron Canadense and Lobelia inflata. Two other plants, Symplocarpus fœtidus and Claytonia virginica, were found, which showed the floral organs well developed and only awaiting a suitable time in which to bloom.

On December 31, the following were found in blossom: Taraxacum officinale, Stellaria media, Veronica Buxbaumii, Lamium amplexicaule and Symplocarpus fœtidus.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Einführung in das Studium der Alkaloide, mit besonderer Berücksichtigung der vegetabilischen Alkaloide und der Ptomaine. Von Dr. Icilio Guareschi, O. Ö. Professor an der königl. Universität Turin, und Director des pharmaceutisch-chemischen und toxicologischen Instituts. Mit Genehmigung des Verfassers in deutscher Bearbeitung herausgegeben von Dr. Hermann Kunz-Krause, dozent für allgemeine und pharmaceutische Chemie an der Universität Lausanne. Erste Hälfte. Berlin, 1896. R. Gaertner's Verlagsbuchhandlung, Hermann Heyfelder.

In publishing a German translation of Guareschi's "Introduzione allo Studio degli Alcaloidi," Dr. Kunz-Krause has made available to a large number of readers what would otherwise be a sealed book. The first half is now obtainable, and the second half will appear during the year 1897. After a brief introduction, the work very properly begins with a historical review, in which the development of the alkaloids is shown to have been the work of chemists of the nineteenth century. Beginning with the discovery of morphine, by Sertürner, in 1805, this historical summary is divided by the author into six periods, as follows:

Period 1.—Discovery of numerous vegetable alkaloids, 1806–1835.

Period 2.—Investigation of the coal-tar bases (aniline), 1834–1848.

Period 3.—Discovery of pyridine and quinoline bases.

Period 4.—Synthesis of the oxy-ethylene bases and of the paraconiines; theory of the constitution of pyridine and quinoline.

Period 5.—Discovery of ptomaine and leucomaine.

Period 6.—Synthesis of a large number of basic pyridine and quinoline derivatives, and the investigation of the constitution of the natural alkaloids.

The history is followed by a brief description of the properties of the various organic bases and a discussion of their structural relations. Several pages are devoted to the alkaloidal reagents, and the behavior of each towards the alkaloids is explained. Following this is a short summary on classification and nomenclature, in which the great body of the book is divided into five sections, as follows: I, Bases of the Open Chain Series; II, Bases of the Closed Chain Series; III, Metal Amines; IV, Alkaloids in the Narrower Sense; V, Ptomaines and Leucomaines. The present volume is largely occupied by the first two sections, and consequently embraces most of the synthetic organic bases, as well as those natural alkaloids whose structure has been established.

The whole book is very systematically arranged, and furnishes abundant material for prolonged study by everyone who is interested in this important

branch of organic chemistry. It is a great credit to both author and translator, and we look forward with interest to the appearance of the second half.

COMMERCIAL ORGANIC ANALYSIS. A treatise on the properties, proximate analytical examination, and modes of assaying the various organic chemicals and products employed in the arts, manufactures, medicine, etc., with concise methods for the detection and determination of their impurities, adulterations, and products of decomposition. By Alfred H. Allen, F.I.C., F.C.S. Second Edition. Vol. III, Part III. Philadelphia: P. Blakiston, Son & Co. 1896.

The installment of this work now published is nominally Part III of Volume III, though practically it forms Volume V of the book. One more volume, treating of proteids and albuminoid compounds, will complete the work. The part now issued treats of the less important vegetable alkaloids, left over from Part II; non-basic vegetable bitter principles; animal bases, including ptomaines; animal acids, and cyanogen compounds. Although considered by the author as less important alkaloids, still there are among them those derived from ipecac, colchicum, calabar bean and jaborandi, which makes them of considerable importance.

The same systematic treatment has been accorded these alkaloids that was given to those in Part II, and it serves to make the two volumes the most important works on this subject in the English language. About one hundred pages are devoted to the non-basic vegetable bitter principles. The literature concerning these important compounds is very voluminous, and the author has sifted that so as to make it available to other chemists. Not the least in this class is his condensed statement concerning the constituents of digitalis, about which so much has been written that in many minds the whole subject is decidedly mixed.

Under the animal bases we have the whole subject of estimating urea as well as the latest information concerning creatine and creatinine; these have also been exhaustively treated in the author's *Chemistry of the Urine*, published over a year ago.

The whole book is fully equal in value to its predecessors, and the final volume is looked forward to with interest.

POPULAR GERMAN NAMES OF DOMESTIC DRUGS AND MEDICINES (Volksthümliche deutsche Arzneimittel-Namen). Compiled by Dr. Fr. Hoffmann. Revised and enlarged edition. Pharmaceutical Review Publishing Company, Milwaukee. 1896.

Dr. Hoffmann has performed a real service for the American druggist by compiling this list of popular German names and arranging them so as to be available to every one but the most stupid. In nearly all parts of the United States the pharmacist is confronted in his daily practice with the German names of many of the simpler drugs. The book can be had of the Pharmaceutical Review Publishing Company, at the moderate cost of fifty cents per copy.

LE COMMERCE ACTUEL DE L'HERBORISTERIE DANS UNE RÉGION DU LANGUEDOC. Par le Dr. Louis Planchon.

Reprint from *Journal de Pharmacie et de Chimie*, 1896. An interesting contribution to the local flora of a region very rich in medicinal plants.

La Composition des Peptones de Viande. Par A. Denaeyer. A communication to the second International Congress of Applied Chemistry at Paris. 1896. Reprinted from *Annales de Pharmacie.*

Prospectus of the Twenty-fifth Annual Session of the California College of Pharmacy. Session of 1897.

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# MINUTES OF THE PHARMACEUTICAL MEETING.

Philadelphia, January 20, 1897.

The regular Pharmaceutical Meeting was held in the Museum of the College. Mr. J. W. England was chairman. The minutes of the previous meeting were allowed to stand as published.

Professor Trimble called attention to a sample of the genuine kino of Eucalyptus rostrata, which had been sent by Mr. J. H. Maiden, of Sydney, New South Wales; also to a sample of Texas rhatany Kramerie secundiflora, which was collected in Mexico and presented by Prof. Alfonso Herrera; and also to some specimens of cultivated canaigre root, which were grown in California and were unusually large.

Mr. Lyman F. Kebler read a paper on the "Volumetric Estimation of Acetone" (see p. 65), which was considered to be particularly opportune, inasmuch as the various applications of acetone as a solvent have only just begun.

The author stated that the methods for estimating the percentage of acetone were not yet perfected, and that only the amount of iodoform producing bodies could be determined in the commercial product.

Mr. Edward T. Hahn read a paper on "Terpin Hydrate" (see p. 73), and said that his experiments had been made with a view of producing the crystals of this substance, rather than studying its therapeutic properties, or of determining its ultimate composition. Samples which had been made with ethyl alcohol and also with methyl alcohol accompanied the paper.

After the reading of the papers, an interesting discussion on the subject of the manufacture of some galenicals from fluid extracts ensued, and was participated in by Mr. Kebler, Mr. England, Professor Remington and others. The question was introduced at the December meeting by Mr. Kebler, but was deferred on account of lack of time, and in the meantime he received letters on the subject from Dr. E. R. Squibb (see p. 98), Dr. Chas. Rice (see p. 99) and Prof. J. U. Lloyd (see p. 102).

Mr. Kebler prefaced his remarks by saying that the commercial aspect of the question could not be taken into consideration; that human life was too valuable for this phase of the subject to merit any attention in this connection.

He said in considering the merits and demerits of the main subject that "when it comes to the question of making infusions from the fluid extracts, it must be admitted, on the one hand, that it is wrong in many cases, in the light of our present knowledge; but, on the other hand, it remains to be demonstrated that an infusion made from a fluid extract is less active, therapeutically, than one from the drug direct. In some cases an aqueous menstuum will educe active constituents that are insoluble in alcoholic solutions and *vice*

*versa.* But when we enter the field of manufacturing tinctures and some other preparations from the respective fluid extracts, debatable ground is invaded."

Before taking up this question he deemed it necessary to state that if the position were taken that a U.S.P. preparation was U.S.P. only when made strictly according to the directions therein laid down, and could not be made in any other way, there was only a single answer to the question.

Some of the faulty and imperfect tests and methods of the Pharmacopœia were referred to, as well as some of the duplicate processes sanctioned by it, as in the case of the processes for the manufacture of fluid extracts, and thus the Pharmacopœia itself was considered to justify, in a measure, the application of processes which seemed best adapted to the needs of the case.

Standardized preparations and the manufacture of other preparations from them then claimed the speaker's attention. He said that the 1890 Pharmacopœia had incorporated methods for assaying the crude drugs cinchona, nux vomica and opium, as well as some of their preparations; and that the next revision would, undoubtedly, be enriched by methods for assaying a number of other drugs and their preparations. The assay processes already authorized had been introduced on account of the great variability of the drugs to which they were applied. Then referring to his analytical records the speaker said that these showed that there were other drugs equally variable in character; for instance, one bale of aconite root assayed 0·4 per cent. total alkaloids, and another 1·14 per cent., or one root was nearly three times as potent as the other. It was evident that tinctures and fluid extracts, made according to the Pharmacopœia from these roots, would vary accordingly. In other words, the tincture made from the root containing the high percentage of alkaloids would be as powerful as the fluid extract made from the lower assaying root. This was not an isolated case, but similar data could be furnished for other drugs.

The problem of extracting the active principles from the drugs completely was next considered, and the speaker said that again and again cases had come to his notice where only one-half, three-fifths, two-thirds or three-fourths of these principles had been extracted from the drug operated upon. The foreman of the fluid-extract department of a large wholesale house was quoted as saying: "The manufacture of unassayed preparations and of standardized preparations are two different things. Before assaying was adopted, appearance was the only requirement, whether one-half or one-third of the active principles was extracted."

Then, summarizing his opinions, with reference to the foregoing statements, the speaker said: "In view of the variableness of the drugs, and the element of uncertainty introduced in manufacturing the various preparations, which is the most rational course to pursue: to make tinctures, varying in strength from a very small potency to the strength of fluid extracts, and fluid extracts, solid extracts, etc., varying in the same degree; or to make preparations that are uniform in strength?" In his mind there was only one answer. And again: "What tinctures, for example, will possess the greater degree of uniformity—those made from crude drugs varying extremely in potency, or those prepared from standardized fluid extracts, etc.?"

It was stated that, in preparing tinctures from their respective fluid extracts, the menstrua directed to be used were usually of such a strength that precipitation was obviated. In some cases, a small precipitate settled out on standing;

but this was also true of tinctures freshly prepared from the drug. If it was inert in one case, it remained to be demonstrated that it was not in the other.

The chairman, Mr. Joseph W. England, was opposed to the manufacture of other galenicals from fluid extracts, and referred to a paper prepared by him and published in the September, 1893, number of this JOURNAL, upon the question : "Is it possible to produce fluid extracts of such strength that they can be diluted with proper menstrua to standard tinctures?" Much of the argument then presented was brought forward by the speaker in support of his views on the subject proposed for discussion.

One of the statements which he emphasized was that different classes of proximate principles were yielded to menstrua of varying strength, and hence official tinctures could not be made from the respective fluid extracts, inasmuch as the menstrua for these two classes of preparations varied greatly in their proportions of alcohol and water as applied to different drugs, and in evidence of this, the menstrua for a number of these preparations were given in tabular form.

The claim was also made that an officially made tincture was relatively stronger than the corresponding fluid extract, the relatively larger dose of the fluid extract confirming this opinion.

The speaker stated that many manufacturers did not make their fluid extracts according to Pharmacopœial directions, but according to methods which their own experience suggested. Another point was the variation in menstrua which they used, which neither agreed with the Pharmacopœial requirements nor among themselves.

He, therefore, concluded that it was impossible to make tinctures uniform in strength from fluid extracts, whether these were assayed or not, inasmuch as the assay processes used likewise varied, as well as the standards assumed for many drugs.

Professor Remington said that the main question was in reference to the objects had in view concerning these two classes of preparations; that fluid extracts were intended to be permanent preparations and were made strongly alcoholic, while on the other hand, the menstrua for tinctures were made as aqueous as possible, and still extract and retain the desirable constituents of the drug.

He also said that some principles which could not be obtained with a small amount of dilute menstruum could be extracted from the drug by the use of a larger quantity of the solvent, whereas in the case of fluid extracts the object was to limit the quantity of menstruum.

In his opinion, to consider the question in reference to standardized fluid extracts was to limit it, as many manufacturers, who do not standardize these preparations, nevertheless give directions for diluting them in the preparation of tinctures.

The speaker remarked upon the custom among manufacturers of storing fluid extracts for a time and then removing the precipitates formed, and questioned the propriety of making tinctures from fluid extracts thus deprived of some of their constituents.

On motion, the meeting adjourned.

T. S. WIEGAND,
*Registrar.*

THE AMERICAN

JOURNAL OF PHARMACY

*MARCH, 1897.*

## ACETIC ACID AS A MENSTRUUM AND SOLVENT.

By Joseph P. Remington.

Any one who has delved, even moderately, into the pharmacy of the ancients, must have noticed the frequency with which the vinegar of that time was used as a solvent, but the nineteenth century has witnessed the gradual decline of the use of acetic acid in pharmacy.

The alcohol question, which is so perplexing, and which is still unsettled, furnishes a reason for diverting the attention of the pharmacist to some liquid which will, occasionally, take its place. The object of the following experiments is to determine whether acetic acid cannot be made to replace alcohol in at least some of the preparations now in common use.

The antiseptic power of acetic acid is frequently overlooked, and there is no question that the vinegars, if properly made, could advantageously replace many tinctures.

Slightly acidulated liquids are palatable to most patients, and these, when combined in prescriptions with syrups, are particularly acceptable, inasmuch as the acid counteracts the cloying sweetness of the syrups.

Then again, it is very desirable for physicians to have alternative preparations of the same drug to give to patients who are liable to become victims of the alcohol habit, and it cannot be denied that the prescribing of tinctures, elixirs and other alcoholic preparations have been the innocent means of working disaster.

The writer, four years ago, made a number of fluid extracts, using acetic acid in place of alcohol. These have been allowed to stand

alongside of others which have been made with alcohol, and most of them have proved their superiority. It is the intention to report upon these later.

It will at once occur to the reader that the presence of strong acetic acid in a fluid extract would be objectionable on account of its taste; but it can be shown that it is possible to evaporate the fluid extract at a very low temperature, thus getting rid of the acetic acid, and then re-dissolving a proper portion of the extract in a solvent. If this extract be standardized, a definite preparation is secured. It is true that a portion of the extractive seems to be rendered insoluble during the evaporation; but the experiments will show that this can be re-dissolved by varying the menstruum, and, in addition, it can be shown that this insoluble extractive usually represents inert substances.

In the following experiments the acetic extract of nux vomica was prepared with a 10 per cent. acetic acid, made by Dr. E. R. Squibb & Sons, and proved by assay to contain 15 per cent. of alkaloids.

These acetic extracts can be made dry and pulverulent, and to distinguish them the writer proposes for them the name of "Acetracts."

No. 1.—2 gm. acetract nux vomica, treated with 100 c.c. alcohol, sp. gr. ·819, yielded a light-colored tincture; the residue weighed 1·112 gm., and was not devoid of bitterness, plainly indicating that the alcohol was too strong.

No. 2.—2 gm. acetract nux vomica, treated with a menstruum of 75 c.c. alcohol and 25 c.c. water, yielded a residue weighing 0·502 gm. The residue was very slightly bitter and practically an inert substance. The tincture was limpid, transparent and of a dark amber color.

No. 3.—2 gm. acetract nux vomica, treated with a menstruum of 70 c.c. alcohol and 30 c.c. water, yielded a residue weighing 0·444 gm. This had a very slightly bitter taste, and was practically exhausted, producing a limpid, dark brownish-red liquid.

No. 4.—2 gm. acetract nux vomica, treated with a menstruum of 65 c.c. alcohol and 35 c.c. water, yielded a residue weighing 0·360 gm. The liquid was not clear, a fine, brownish-red precipitate making its appearance. The liquid could not be filtered satisfactorily, and a small portion which was filtered continued to let fall a precipitate.

No. 5.—2 gm. acetract nux vomica, treated with a menstruum of 60 c.c. alcohol and 40 c.c. water, yielded a residue weighing 0·410 gm. The liquid was not clear, filtering with great difficulty, the precipitate not settling.

No. 6.—2 gm. acetract nux vomica, treated with a menstruum of 55 c.c. alcohol and 45 c.c. water, yielded a residue weighing 0·340 gm. The liquid was not clear, filtering with great difficulty, the precipitate not settling.

No. 7.—2 gm. acetract nux vomica, treated with a menstruum of 50 c.c. alcohol and 50 c.c. water, yielded a residue weighing 0·320 gm. The liquid was muddy, precipitate not settling, and not easily filtered.

No. 8.—2 gm. acetract nux vomica, treated with a menstruum of 45 c.c. alcohol and 55 c.c. water, yielded a residue weighing 0·246 gm. Liquid cloudy, precipitate settling in three days, filtering with difficulty.

No. 9.—2 gm. acetract nux vomica, treated with a menstruum of 40 c.c. alcohol and 60 c.c. water, yielded a residue weighing 0·450 gm. Liquid muddy, not easily filtered. The addition of a little talc improved filtering.

No. 10.—2 gm. acetract nux vomica, treated with a menstruum of 35 c.c. alcohol and 65 c.c. water, yielded a residue weighing 0·338 gm. Liquid not clear; not easily filtered.

No. 11.—2 gm. acetract nux vomica, treated with a menstruum of 30 c.c. alcohol and 70 c.c. water, yielded a residue weighing 0·360 gm. Liquid not clear, filtered with difficulty, and filtrate does not remain clear.

No. 12.—2 gm. acetract nux vomica, treated with a menstruum of 25 c.c. alcohol and 75 c.c. water yielded a residue weighing 0·378 gm. Liquid not clear, but filtered more easily than No. 11.

No. 13.—2 gm. acetract nux vomica, treated with a menstruum of 20 c.c. alcohol and 80 c.c. water, yielded a residue weighing 0·476 gm. Liquid not quite clear, filters without much difficulty, but slowly.

No. 14.—2 gm. acetract nux vomica, treated with a menstruum of 15 c.c. alcohol and 85 c.c. water, yielded a residue weighing 0·426 gm. The liquid was not quite clear, but filtered fairly well.

No. 15.—2 gm. acetract nux vomica, treated with a menstruum of 10 c.c. alcohol and 90 c.c. water, yielded a residue weighing 0·376

gm. Liquid not clear, deposits some sediment, and showed evidence of decomposition ten days after preparation.

No. 16.—2 gm. acetract nux vomica, treated with a menstruum of 65 c.c. alcohol, 10 c.c. glycerin, and 25 c.c. water, left very slight residue, filtered easily and remained clear.

No. 17.—2 gm. acetract nux vomica, treated with a menstruum of 50 c.c. alcohol, 25 c.c. glycerin and 25 c.c. water, left very slight residue, filtered easily but slowly, and remained clear.

No. 18.—2 gm. acetract nux vomica, treated with a menstruum of 40 c.c. alcohol, 30 c.c. glycerin and 30 c.c. water, left very little residue, filtered easily, and remained clear.

No. 19.—2 gm. acetract nux vomica, treated with a menstruum of 20 c.c. alcohol, 20 c.c. glycerin and 60 c.c. water, left very slight residue, filtered very slowly, but clear.

No. 20.—2 gm. acetract nux vomica, treated with a menstruum of 10 c.c. alcohol, 10 c.c. glycerin and 80 c.c. water, left very slight residue, filtered easily, but not quite clear.

No. 21.—2 gm. acetract nux vomica, treated with a menstruum of 100 c.c. diluted acetic acid, and 1 gm. ground nux vomica added to the percolate to aid in filtration. The liquid was not quite clear.

No. 22.—1 gm. acetract nux vomica, treated with a menstruum of 100 c.c. diluted acetic acid, gave a liquid which was not easily filtered, but which remained clear.

No. 24.—2 gm. extract nux vomica, treated with 100 c.c. alcohol, left a residue 0·352 gm. The liquid was light-colored, filtered easily and remained perfectly clear.

No. 25.—2 gm. extract nux vomica, treated with a menstruum of 75 c.c. alcohol and 25 c.c. water, left a residue weighing 0·122 gm. The liquid was dark brownish-red, remaining perfectly clear, but throwing down a very slight dark precipitate after filtering.

No. 26.—2 gm. extract nux vomica, treated with a menstruum of 70 c.c. alcohol and 30 c.c. water, left a residue weighing 0·188 gm. The liquid remained clear after filtering, but with a slight precipitate.

No. 27.—2 gm. extract nux vomica, treated with a menstruum of 65 c.c. alcohol and 35 c.c. water, left a residue of 0·212 gm. The liquid was clear, a slight precipitate settling after the liquid was filtered.

No. 28.—2 gm. extract nux vomica, treated with a menstruum of

60 c c. alcohol and 40 c.c. water, left a residue of 0·232 gm. The liquid was clear.

No. 29.—2 gm. extract nux vomica, treated with a menstruum of 55 c.c. alcohol and 45 c.c. water, left a residue of 0·31 gm. The liquid was clear, a slight precipitate settling after filtration.

No. 30.—2 gm. extract nux vomica, treated with a menstruum of 50 c.c. alcohol and 50 c.c. water, left a residue of 0·316 gm. The liquid was not quite clear, a slight precipitate settling after filtration.

No. 31.—2 gm. extract nux vomica, treated with a menstruum of 45 c.c. alcohol and 55 c.c. water, left a residue of 0·31 gm. The liquid was not clear, a precipitate settling.

No. 32.—2 gm. extract nux vomica, treated with a menstruum of 45 c.c. alcohol and 60 c.c. water, left a residue of 0·342 gm. The liquid was cloudy, a very slight precipitate after filtration.

No. 33.—2 gm. extract nux vomica, treated with a menstruum of 35 c.c. alcohol and 65 c.c. water, left a residue of 0 40 gm. The liquid was cloudy.

No. 34.—2 gm. extract nux vomica, treated with a menstruum of 30 c.c. alcohol and 70 c.c. water, left a residue of 0·430 gm. The liquid was cloudy.

No. 35.—2 gm. extract nux vomica, treated with a menstruum of 25 c.c. alcohol and 75 c.c. water, left a residue of 0·40 gm. The liquid was cloudy.

No. 36.—2 gm. extract nux vomica, treated with a menstruum of 20 c.c. alcohol and 80 c.c. water, left a residue of 0·372 gm. The liquid was cloudy.

No. 37.—2 gm. extract nux vomica, treated with a menstruum of 15 c.c. alcohol and 85 c.c. water, left a residue of 0·420 gm. The liquid was cloudy.

No. 38.—2 gm. extract nux vomica, treated with a menstruum of 10 c.c. alcohol and 90 c.c. water. The residue not weighed. The liquid was not clear.

No. 39.—2 gm. extract nux vomica, dissolved in 100 c.c. water, left residue 0·40 gm. The liquid was muddy, and, upon standing, showed evidence of decomposition.

No. 40.—2 gm. extract nux vomica, dissolved in 100 c.c. diluted acetic acid. The liquid was a clear, light amber color.

No. 41.—2·4 gm. extract nux vomica, dissolved in 2,400 c.c.

diluted acetic acid. The liquid was clear and of a light amber color.

It will be observed that the object of these experiments is to ascertain whether acetic acid can advantageously replace alcohol in the extraction of a drug like nux vomica. The answer is decidedly in the affirmative. Acetic acid may be used for exhausting a drug known to be difficult to exhaust, like nux vomica.

A solid preparation can be made from it; this can be assayed and standardized, and the liquid preparations made by re-dissolving the solid in various mixtures of alcohol and water, with or without glycerin, and of different strengths of acetic acid.

If the proper menstruum be chosen, the residue will be inert, and may be filtered out. A number of other drugs have been exhausted with varying strengths of acetic acid, such as sanguinaria, kola, ipecac, squill, cinchona and colchicum seed.

A number of samples are presented, and especial attention is called to sanguinaria with acetic acid 60 per cent. This fluid extract has been made four years, and does not show the least sign of precipitation.

It, doubtless, would be just as satisfactory if made with U.S.P. acetic acid, and experiments are being conducted now, which will prove this view.

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## FRANGULA AND CASCARA BARKS.

### TO DISTINGUISH BETWEEN RHAMNUS PURSHIANA AND RHAMNUS FRANGULA, AND TO EXCLUDE RHAMNUS CALIFORNICA, IN THE STATE OF POWDER,

BY L. E. SAYRE,
Member of the Research Committee C, of the Committee of Revision of the United States Pharmacopœia.

One of the problems submitted to this committee is embraced in the title to the present paper. For the purpose of the investigation, authentic specimens of the barks were received from the chairman of the sub-committee, Dr. Rusby, who had them specially collected for the work.

In order to arrive at a conclusion as to the best method of distinguishing the barks in the state of powder, it was, of course, necessary, first to study them microscopically, and, if possible, find distinctive elements which might survive pulverization, and be recognizable in the state of powder.

The description of the gross characteristics of these barks may contribute little to the purpose of the investigation; but these should be stated, as they have a bearing upon pharmacopœial description, an item of interest to every worker in pharmacopœial revision.

Taking the specimens, furnished as above stated, I should say that the pharmacopœial description of Rhamnus Purshiana is somewhat faulty; the color of the bark on the outside cannot be considered as a "brownish gray," but a dark gray; the thickness, instead of being "about 2 millimeters," is about 1 millimeter. For

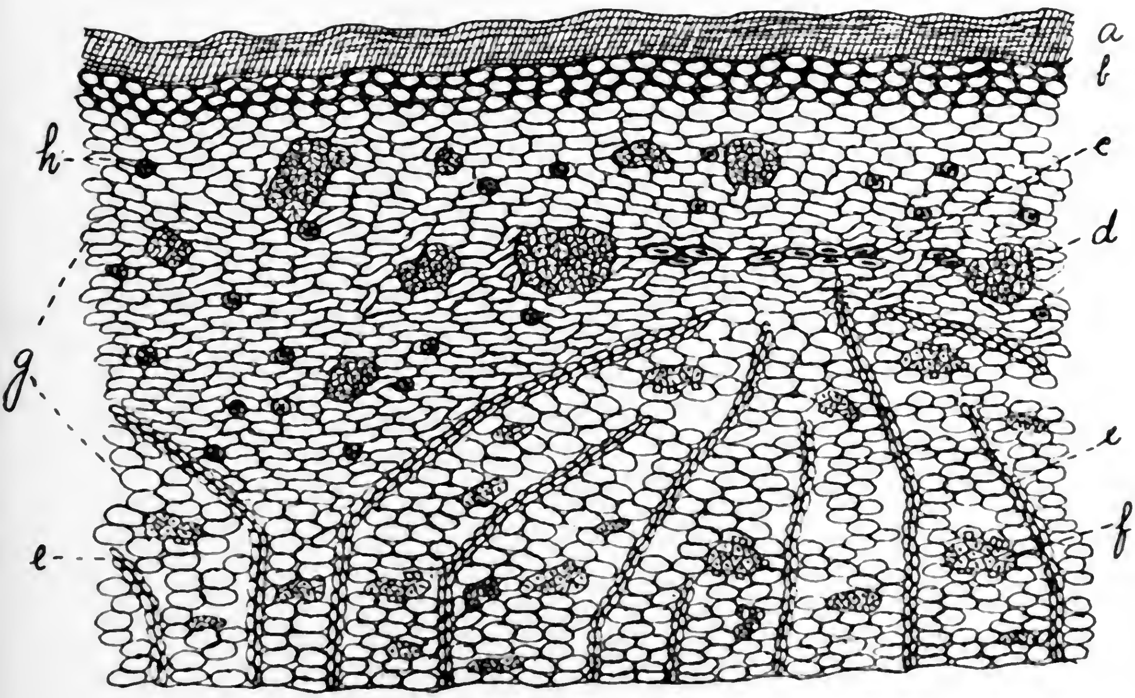


*Fig. 1*, Rhamnus Purshiana, cross section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *d*, stone cells; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

a description of the external characteristics of the three barks, using the specimens furnished as a guide, I should perhaps adopt in substance the following:

*Rhamnus Purshiana.*—In quills or curved pieces, about 3 to 10 centimeters long, and about 1 millimeter thick; outer surface dark gray and much encrusted by ashen gray lichen patches, with longitudinal grooves from 3 to 10 millimeters apart; inner surface yellowish to light brownish, becoming darker by age; smooth, glossy and finely striate; fracture short, yellowish; in the inside

layer of thick bark, somewhat fibrous and slightly bitter. When chewed the bark imparts a yellowish color to the saliva.

*Rhamnus Californica.*—In quills or curved pieces about 3 to 10 centimeters long, and about 1·5 millimeters thick; outer surface grayish brown, beset with numerous lenticels, which are from round to transversely elongated, infrequently longitudinally elongated, and often longitudinally confluent. On scraping the surface of the bark a reddish brown color is observed, which is due to the contents of

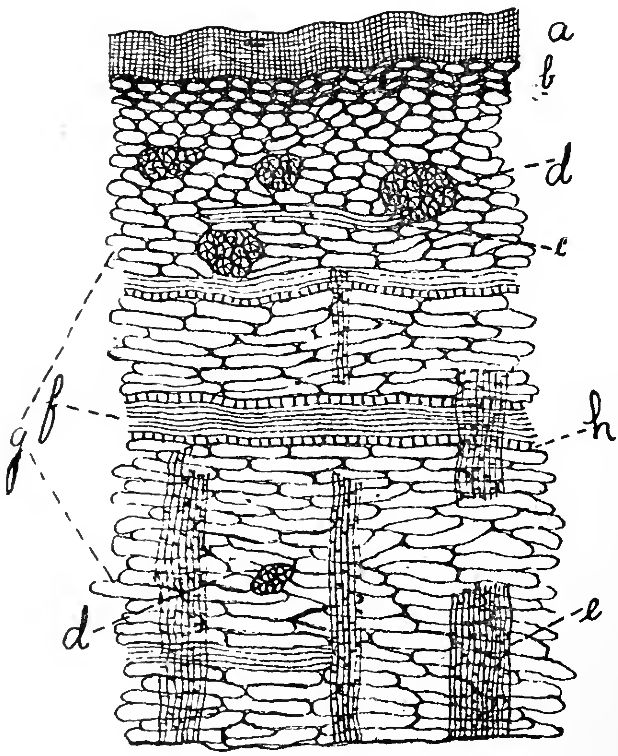


*Fig. 2*, Rhamnus Purshiana, longitudinal section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *d*, stone cells; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

the cork cells. Inner surface reddish brown to dark brown; smooth, glossy and finely striate; fracture short (inner layer of thick bark, although somewhat fibrous; breaks with a short fracture); inodorous and slightly bitter. When chewed the bark imparts an orange-reddish color to the saliva.

*Frangula.*—See U.S.P. External character of this bark answers well to official description.

From the marked physical distinction between these barks, one

might suppose it an easy task to distinguish between them in powder; but such is not the case; although differing widely in appearance, they possess very similar microscopical or anatomical structure. The points of similarity may be stated briefly as follows:

(1) Narrow medullary rays, which extend nearly to the cork, these rays in Rhamnus Purshiana *converging at their outer ends.*

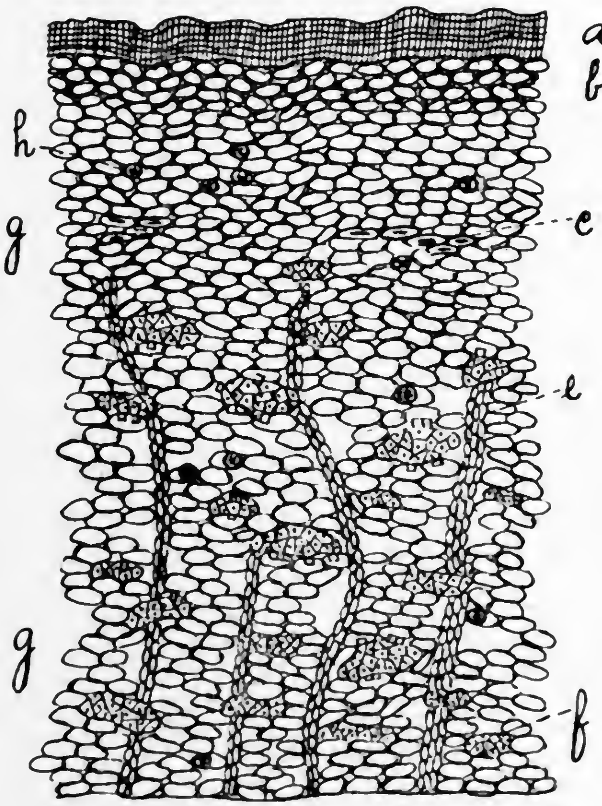


*Fig. 3*, Rhamnus Frangula, cross section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

(2) Numerous small groups of bast scattered somewhat regularly throughout nearly the whole bark, the number of fibres in the bast bundle varying from 2 to 3 to perhaps 25 in each bundle.

(3) Each bundle of bast is bordered by a layer of thin-walled cells, filled with cubical crystals of calcium oxalate; these crystal cells appearing very distinctly in longitudinal section, and in the powder. (See drawings.)

(4) In each, the relative amount of cork, of collenchyma and of parenchyma is about the same.

These structural similarities would seem to make the distinction between the pulverized barks quite difficult, but fortunately, for this purpose, there are a very few points of dissimilarity revealed by the compound microscope and reagents, which may serve the pharmacologist.

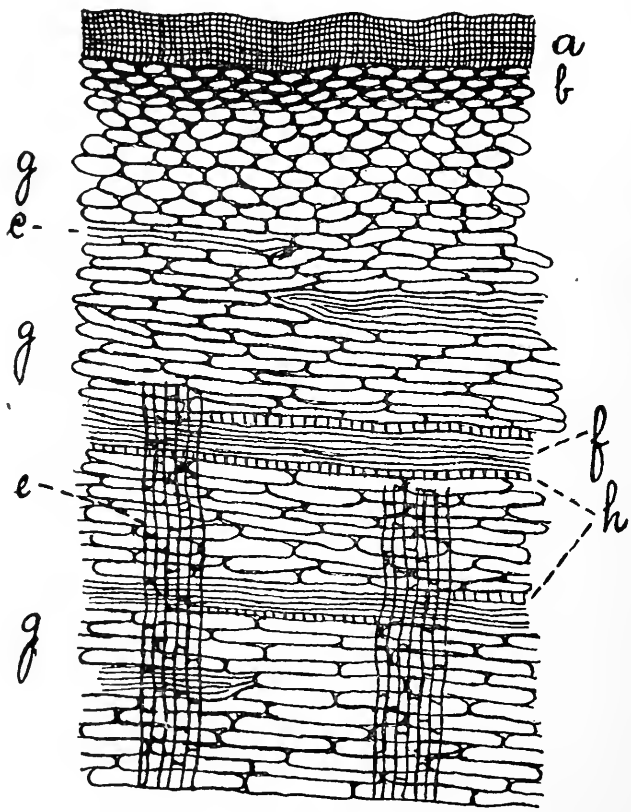


*Fig. 4*, Rhamnus Frangula, longitudinal section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

Rhamnus Frangula contains no stone cells, while the Rhamnus Californica and the Rhamnus Purshiana contain a large number of them, scattered in large, irregular groups below the cork, and usually outside the region of bast. The presence or absence of stone cells is very easily noted by one familiar with vegetable tissues, and this one characteristic is suggested as a means of distinction between Rhamnus Frangula and the other two barks.

In the case of Rhamnus Purshiana and Rhamnus Californica, it

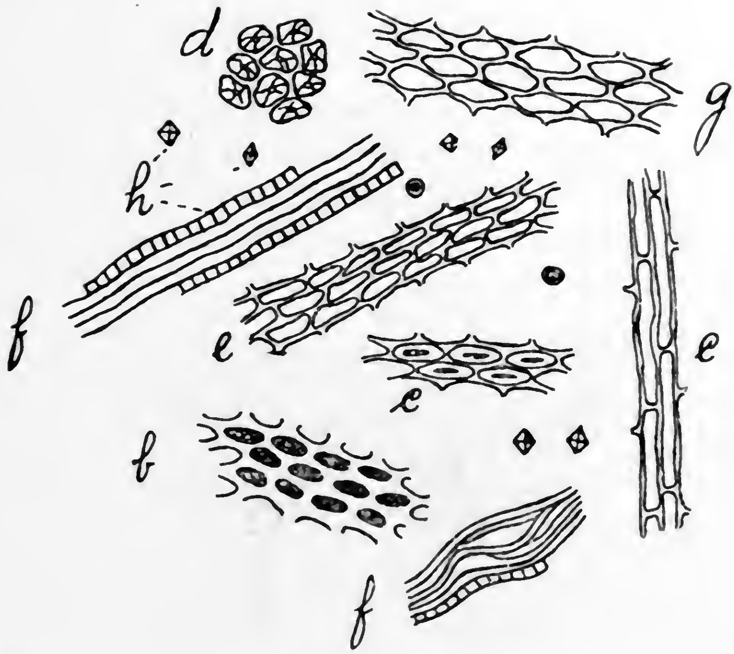


*Fig. 5*, Rhamnus Californica, powder. *B*, collenchyma; *c*, sclerenchyma (cross); *c'*, sclerenchyma (longitudinal); *d*, stone cells; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

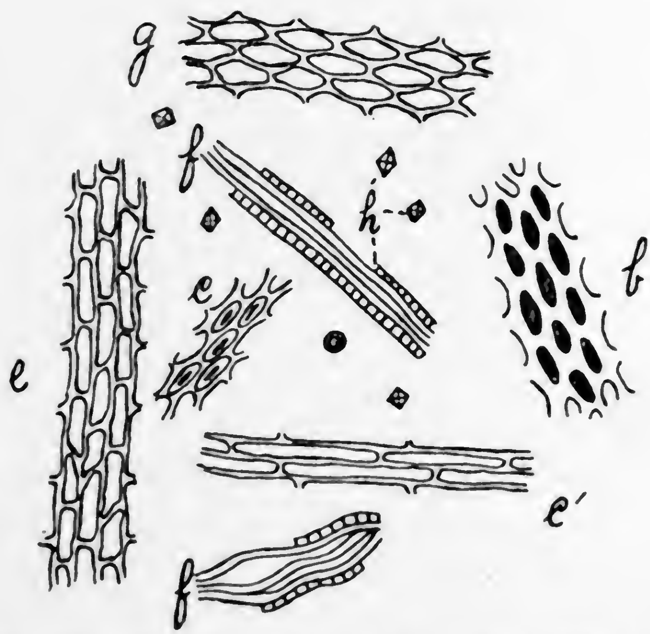


*Fig. 6*, Rhamnus Frangula, powder. *B*, collenchyma; *c*, sclerenchyma (cross); *c'* sclerenchyma (longitudinal); *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

seems that no microscopical element can be detected sufficiently reliable to depend upon as a means of distinguishing the two species, the one from the other. However, if the powder be macerated several days in diluted alcohol, a very marked difference may be noted; the powder of Rhamnus Purshiana will be of an orange-yellow color, when mounted for microscopical examination, and when viewed by a moderately high power the various tissues will come out clearly, while the powder of Rhamnus Californica, sub-

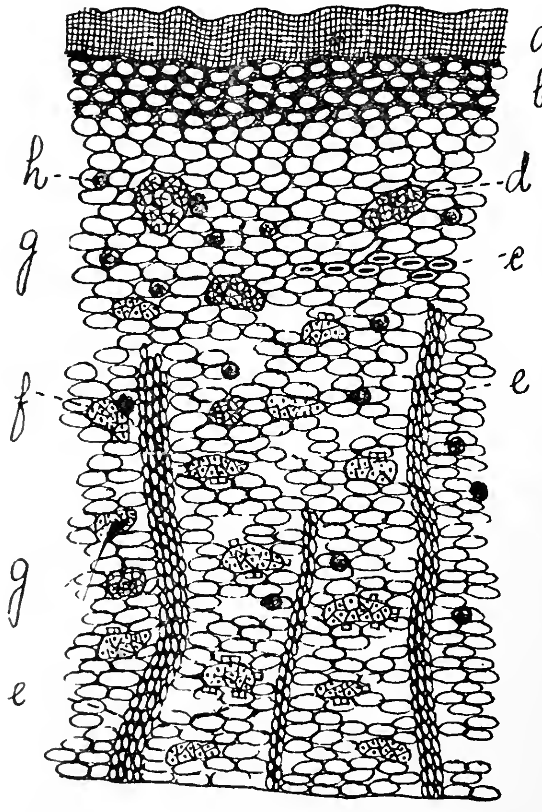


*Fig.* 7, Rhamnus Californica, cross section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *d*, stone cells; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

jected to the same treatment, assumes a purplish color, and when viewed through the lens the tissues seem to be obscured more or less by a dark coloring matter. If to a small quantity of the powdered barks an alkaline solution be added, the color developed in the Rhamnus Californica is a deep red, while that of the Purshiana is orange. This test may be briefly stated as follows: If 0·2 gramme of the powdered bark be placed in a small test tube, and

there be added 2 c.c. of solution of potassa, T. S., Rhamnus Californica will immediately produce a blood-red color, while Rhamnus Purshiana will produce an orange-red. These differences in *intensity* of color, thus developed, are very marked.

The deep red coloring matter so abundant in Rhamnus Californica is just beneath the outer cork layer, including the phellogen. It can be very plainly seen in the whole bark by the aid of a simple lens.

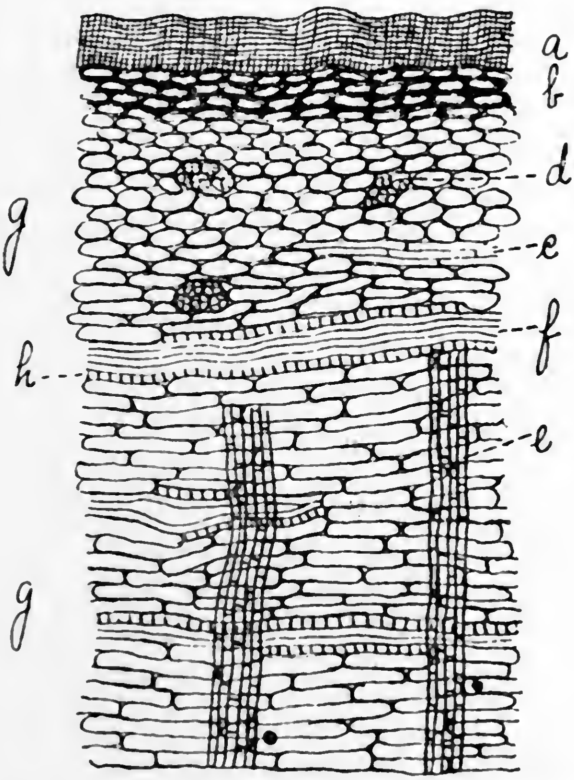


*Fig. 8*, Rhamnus Californica, longitudinal section. *A*, epidermis; *b*, collenchyma; *c*, sclerenchyma; *d*, stone cells; *e*, medullary ray; *f*, bast bundle; *g*, parenchyma; *h*, crystals of calcium oxalate.

The above outline seems to answer well the purpose of distinguishing between the three barks named; but to detect one powder mixed with another would, perhaps, be very difficult even to one perfectly familiar with the drugs. Rhamnus Californica, when used as an adulterant for Rhamnus Purshiana, could be distinguished by the color test if in considerable quantity; small amounts could hardly be detected.

The following addition to the descriptions of the two official

barks, Frangula and Rhamnus Purshiana is suggested. To the description of Frangula add: Medullary rays not converging at the outer ends (distinction from Rhamnus Purshiana). Stone cells absent (distinction from Rhamnus Purshiana and Rhamnus Californica).

To the description of Rhamnus Purshiana add: Medullary rays in groups converging at their outer ends (distinction from Rhamnus Californica). Stone cells present (distinction from Rhamnus Frangula).

*Drawings.*—The description accompanying each one of the drawings presented will aid somewhat in pointing out the structural characteristics above referred to. Figures were drawn, using a 1 inch ocular and $\frac{1}{5}$ objective.

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## A CHEMICAL STUDY OF PHYTOLACCA DECANDRA.[1]

By G. B. Frankforter.

PART FIRST.

The important medical properties of the root of the common poke weed, *Phytolacca decandra*, have made it the subject for a number of investigations. While many important facts have been learned, yet nothing of a definite character in connection with the chemical side of it has been discovered. Crystalline substances have been obtained, but none of them seem to have been carefully studied. It has been with the hope of adding more to the present knowledge of this interesting plant that the following experiments have been conducted.

The root, which has been the principal part of the plant under investigation, was personally obtained, dried and prepared for examination. It has been stated that the root undergoes a change, so that after a year it virtually loses its medicinal properties. The writer has been unable to corroborate this statement. Samples were examined shortly after the roots were gathered, and again after two years. There was no apparent change. The writer therefore believes that if the root is carefully dried immediately after gathering, it will retain its properties for a long time.

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[1] Read before the American Chemical Society, August, 1896, and communicated by the author.

## ANALYSIS OF THE ASH.

It seldom occurs that a common plant is characterized by the inorganic substance it contains. In this respect the poke weed seems to be an exception to the rule. Mention has been made of the large per cent. of potassium present, but beyond this the writer has been unable to find any analyses of the inorganic part of the plant. In order to verify the above statement, and to throw more light on the inorganic side of the plant, a complete analysis of the ash was made. The root was carefully cleaned, in order to remove any soil from the surface, carefully dried and analyzed. Three analyses gave the following average:

| | Per Cent. |
|---|---|
| Ash or inorganic matter | 13·38 |

The ash contained the following constituents:

| | Per Cent. |
|---|---|
| Potassium oxide | 41·62 |
| Sodium oxide | 4·41 |
| Calcium oxide | 4·13 |
| Aluminum oxide | 1·62 |
| Iron oxide | 0·59 |
| Magnesium oxide | 6·25 |
| Carbon dioxide | 30·01 |
| Chlorine | 2·25 |
| Phosphorus pentoxide | 3·54 |
| Silicon dioxide | 5·21 |
| Total | 99·63 |

It will be observed that the plant is exceptionally rich in potassium. It was at first suspected that this high per cent. of potassium was characteristic of the locality from whence the samples came. Samples from different localities were examined with practically the same results, so that there is little doubt that the plant has the power of assimilating large quantities of potassium. It has been stated that the leaves and stems of the plant contain as high as 4 2 per cent. of potassium hydroxide. This is low as compared with the above analysis, inasmuch as the leaves and stems of plants invariably run higher than the roots in inorganic matter.

## ANALYSIS OF THE GASES GIVEN OFF BY A DESTRUCTIVE DISTILLATION OF THE ROOT.

The gas obtained by a destructive distillation of the root of this plant has been briefly referred to as having a peculiar odor and pro-

ducing dizziness if inhaled.[1] With the hope of throwing some light on this physiologically active gas, a complete analysis of it was made. The gas was prepared by placing a known quantity of the dried root in a hard glass retort, removing the air and heating as long as gas was given off. The gas was collected over mercury. It was found to vary widely at different stages of the distillation. That given off early in the process contained as high as 60 per cent. of gas soluble in water, while that near the end of the process contained less than 2 per cent. The gas at various stages of the distillation was tried on several persons without producing any physiological effects. There is a characteristic odor of ammonia and pyridine derivatives throughout the whole process.

Owing to the wide variation in the composition of the gas given off at different stages of the distillation, a series of analyses were made by heating the substance just long enough to drive off sufficient gas for a single analysis. For the experiment, 7·2 grammes of the dried root were taken. The apparatus used was that already mentioned. The distillation was continued until the gas ceased to come off at a bright red heat.

The following is the result of the twelve analyses in the order in which they were made:

| Analysis. | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia . . . . . . | 65· | 60·2 | 55· | 46· | 37· | 32· | 26· | 24·2 | 17·6 | 15· | 6· | 2· |
| Carbon dioxide . . . | 13· | 13· | 14· | 19·4 | 23· | 24·6 | 24· | 25· | 22·3 | 13· | 12· | 10· |
| Heavy hydrocarbons . | 0·8 | 0·8 | 1·4 | 2· | 2· | 2·2 | 1·7 | 1·5 | 1· | 1·8 | 1· | 1· |
| Oxygen . . . . . . . | 0·4 | 00· | 00· | 00· | 00· | 00· | 00· | 00· | 00· | 00· | 00· | 00· |
| Carbon monoxide . . | 12·2 | 18·6 | 20·1 | 14· | 15·8 | 14· | 12· | 6· | 10·8 | 8·8 | 10· | 9· |
| Hydrogen . . . . . . | 00· | ·6 | 1· | 2·6 | 4· | 6· | 8·6 | 9· | 6·1 | 6·4 | 10· | 17·8 |
| Methane . . . . . . | 0·6 | 1·8 | 3· | 4· | 4· | 3· | 5·2 | 8· | 9· | 10· | 16· | 19·4 |
| Nitrogen . . . . . . . | 8· | 5· | 5·5 | 12· | 14·2 | 16·2 | 22·5 | 26·3 | 33·2 | 45· | 45· | 40·8 |
| Total . . . . . . . | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 | 100·0 |

The gas estimated as ammonia, upon examination, was found to contain other gases, as the amines, but no determinations of the latter have as yet been made. The gas estimated as carbon dioxide

[1] AMERICAN JOURNAL OF PHARMACY, 1888, p. 123.

was largely the peculiar-odored gas which is under examination. It will be seen that the gases increase and decrease quite uniformly. The variations which occur were undoubtedly due to the uneven application of heat.

In order to determine whether or not the nitrogen estimated as such was pure, the hydrocarbons were removed by combustion with pure oxygen, and the residue sparked with excess of oxygen over potassium hydrate until no further change took place. About 200 c.c. of the residue were taken, and at the end of the process there remained 2·6 c.c. of gas, which remained unchanged after several days' sparking gave the spectrum for argon. No satisfactory explanation for this spectrum can as yet be given. The process is being repeated with larger quantities of gas. It seems impossible that this quantity could have come from the air which was left after exhausting the retort with a mercury pump.

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Minneapolis, Minn.

## ESTIMATION OF ASH IN VARIOUS DRUGS.

BY CHARLES H. LAWALL.
Sub-Committee of Research of the United States Pharmacopœial Committee of Revision.

The subject of the inorganic constituents of plants has received very little attention in itself; the existing data are scattered, and, in many cases, obtainable only after a laborious search. One extensive work on the ash in plants was published in 1871.[1]

This concerns itself mainly, however, with the per cent. of ash in various agricultural products. The work is in very few libraries in this country, and it was due to the kindness of Professor Trimble that the author was enabled to consult it before tabulating his results upon this subject.

Works on materia medica usually contain a list of the proximate organic constituents of each plant considered; percentages of these constituents are only given in few cases, and then with no reference to the authority whose figures are used. This is often unsatisfactory,

[1] 1871, *Aschen-analysen von landwirthschaftlichen Producten, Fabrikabfällen und wildwachsenden Pflanzen.* Dr. Emil Wolf.

as in one case which came under the author's notice, the percentage of ash present in a certain drug was stated as "about 8 per cent.;" and, as authentic samples collected by the author gave a maximum of 5·20 per cent., and the highest amount in the commercial drug was 3·42 per cent., the accuracy of the authority quoted is questionable.

Some scattering contributions to this subject have been made in the past few years, but in most cases the data are incomplete in some one respect. It is a matter of surprise to note what little importance has been attached to the moisture in the sample taken for estimation. It is obvious that the moisture content varies with the atmospheric changes to which the drug is exposed, and that the only reliable basis for comparison is the per cent. of ash calculated to, or estimated in, the *moisture-free* substance.

The therapeutic activity of any given drug is attributable to the constituents peculiar to that drug, irrespective of the physiological effects produced by so-called inert cellular tissue. It might, therefore, truthfully be said that: *The therapeutic effect of any given drug is the algebraic sum of the effects of its proximate constituents.* Effect is used in a relative sense only; no uniform or fixed value can be given, in view of the fact that, in no two cases of administration, are the conditions exactly similar. The inorganic constituents may play a very small part in the physiological action of a drug, but, in the present state of our knowledge, no factor, however slight, should be ignored.

Certain groups of plants show marked peculiarities in the amount of ash present. The leaves of those plants belonging to the Natural Order Solanaceæ are noted for the large amount of inorganic matter present; in some instances over 25 per cent., or more than one-fourth their weight, is obtained as ash, upon ignition of a sample.

This work was begun for the purpose of collecting data on a number of the more commonly-used drugs, with the hope that they might be found of service in subsequent studies concerning identification of drugs. The subject proved to be one of great interest, and the results accompanying the present paper are published with the idea that by making occasional contributions of a limited number each time, the tedium of a long, uninteresting list (dry reading at its best) would be avoided, and also that others who are in a po-

| Name of Drug. | Part of Plant Used. | Per Cent. of Active Principle or Extract. | Per Cent. of Moisture. | Per Cent. of Ash. | Constituents of Ash. | Per Cent. of Ash. (Calculated in Dry Substance.) | Per Cent. of Active Principle or Extract. (Calculated in Dry Substance.) |
|---|---|---|---|---|---|---|---|
| *Aconitum* | Tuberous root | 0·52 | 9·57 | 6·07 | HCl, $H_3PO_4$, Fe, Si, Ca, Mg, Al, K, Na, | 6·60 | 0·57 |
| " | " | 1·00 | 7·63 | 4·28 | — | 4·63 | 1·08 |
| " | " | 0·76 | 13·00 | 4·64 | — | 5·34 | 0·87 |
| " | " | 0·66 | 12·58 | 4·78 | — | 5·47 | 0·76 |
| " | " | 0·58 | 12·24 | 3·73 | — | 4·25 | 0·66 |
| " | " | 0·54 | 12·17 | 3·84 | — | 4·37 | 0·61 |
| Aloe Capensis | Inspissated juice | — | — | 0·75 | — | — | — |
| " | " | — | — | 0·83 | — | — | — |
| " | " | — | — | 2·10 | — | — | — |
| *Amylum* (Zea Mays) | Fecula of seed | — | — | 0·169 | — | — | — |
| " | " | — | — | 0·453 | — | — | — |
| " | " | — | — | 0·450 | — | — | — |
| *Belladonnæ Folia* | Leaves | 0·32 | 7·41 | 14·37 | HCl, $H_3PO_4$, Fe, Si, Ca, Mg, Al, K, Na, | 15·52 | 0·35 |
| " " | " | 0·41 | 7·62 | 13·05 | — | 14·12 | 0·44 |
| " " | " | 0·48 | 6·51 | 12·51 | — | 13·39 | 0·51 |
| " " | | — | 8·84 | 13·31 | — | 14·60 | — |
| " *Radix* | Root | 0·34 | 7·67 | 6·55 | — | 7·09 | 3·68 |
| Caffea Arabica | Berries | 1·10 | — | 3·23 | — | — | — |
| *Calumba* | Root | — | 8·34 | 11·71 | $H_3PO_4$, Fe, Al, Si, Ca, Mg, K, Na, | 12·66 | — |
| *Cannabis Indica* | Flowering tops | 8·51 | 9·31 | 19·98 | — | 22·03 | 9·38 |
| " " | " | 14·53 | 5·57 | 18·09 | — | 19·15 | 15·39 |
| *Castanea* | Leaves | — | 7·38 | 3·92 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, Na, | 4·23 | — |
| *Chimaphila* | " | — | 5·71 | 4·74 | HCl, $H_3PO_4$, Fe, Al, Si, Ca, Mg, K, Na, | 5·02 | — |
| *Cinchona Calisaya*[1] | Bark | {8·78, 5·12} | 9·23 | 2·32 | — | 2·55 | {9·66, 5·64} |
| " " | " | {8·36, 4·74} | 8·30 | 3·44 | $H_3PO_4$, Fe, Al, Mn, Si, Ca, Mg, K, Na, | 3·75 | {9·11, 5·16} |
| " *Rubra*[2] | " | 6·25 | 5·99 | 15·28 | — | 16·25 | 6·64 |
| *Coca* | Leaves | 0·40 | — | 9·57 | — | — | — |
| " | " | 0·76 | 9·49 | 10·54 | — | 11·64 | 0·83 |
| *Colchici Radix* | Root | 0·30 | 8·56 | 2·36 | — | 2·58 | 0·32 |
| " *Semen* | Seed | 0·27 | 8·51 | 4·43 | — | 4·84 | 0·27 |
| *Crocus* | Stigmas | — | 10·50 | 5·29 | — | 5·91 | — |
| " | " | — | 13·62 | 4·56 | — | 5·22 | — |
| *Digitalis* | Leaves | 40·03 | 9·12 | 10·04 | HCl, $H_2SO_4$, $H_3PO_4$, Si, Fe, Al, Mn, Ca, Mg, K, Na, | 11·04 | 44·04 |
| " | " | 39·63 | 7·32 | 10·53 | — | 11·36 | 42·78 |
| " | " | 41·73 | 5·22 | 9·63 | — | 10·16 | 44·02 |
| " | " | 40·34 | 9·58 | 9·76 | — | 10·78 | 44·61 |

[1] Figures for both total Alkaloids and Quinine are given.

[2] Ash per cent. highly abnormal

| Name of Drug. | Part of Plant Used. | Per Cent. of Active Principle or Extract. | Per Cent. of Moisture. | Per Cent. of Ash. | Constituents of Ash. | Per Cent. of Ash. (Calculated in Dry Substance.) | Per Cent. of Active Principle or Extract. (Calculated in Dry Substance.) |
|---|---|---|---|---|---|---|---|
| *Eriodictyon* | Leaves | — | — | 8·07 | — | — | — |
| *Extract Glycyrrhiza* | Prepared extract | — | — | 3·08 | — | — | — |
| " " | " | — | — | 3·74 | — | — | — |
| Fagus Ferruginea | Seed | — | 6·01 | 3·27 | — | 3·48 | — |
| *Frangula* | Bark | — | — | 4·60 | — | — | — |
| " | " | — | 10·28 | 6·82 | $H_2SO_4$, $H_3PO_4$, Fe, Al, Ca, Mg, K, | 7·60 | — |
| *Gelsemium* | Root | 0·56 | 7·91 | 3·14 | — | 3·40 | 0·61 |
| " | " | 0·56 | 5·15 | 2·75 | $H_3PO_4$. Fe, Al, Ca, Mg, K, Na, | 2·89 | 0·59 |
| *Geranium* | Rhizome | — | 9·30 | 7·39 | HCl, $H_3PO_4$, Si, Fe, Al, Mn, Ca, Mg, Na, K, | 8·14 | — |
| *Glycyrrhiza* | Root | — | 8·58 | 4·26 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, Na, | 4·66 | — |
| *Guaiaci Resina* | Resin | — | — | 5·30 | — | — | — |
| *Guarana* | Crushed seeds | 4·37 | — | 1·48 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, | — | — |
| " | " | 4·68 | 7·06 | 1·04 | — | 1·11 | 5·03 |
| *Hamamelis* | Bark | — | — | 3·80 | — | — | — |
| *Humulus* | Strobiles | — | 8·66 | 8·51 | HCl. $H_2SO_4$, $H_3PO_4$, Fe, Al, Ca, Mg, K, Na, | 9·31 | — |
| Hydrangea | Root | — | 5·87 | 2·79 | HCl $H_3PO_4$,Fe, Al, Ca, Mg, K, Na, | 2·96 | — |
| *Hydrastis* | Rhizome | 2·80 | 8·19 | 8·65 | HCl. $H_3PO_4$, Si, Fe, Al, Ca, Mg, K, Na, | 9·42 | 3·05 |
| *Hyoscyamus* | Leaves | 0·16 | 6·89 | 21·86 | HCl, $H_2SO_4$, Si, Fe, Al, Mn, Ca, Mg, K, Na, | 23·47 | 0·17 |
| *Ipecacuanha* | Root | 2·30 | 9·51 | 3·89 | — | 4·29 | 2·54 |
| " | " | 2·15 | 9·16 | 3·35 | — | 3·68 | 2·36 |
| *Jalapa* | Tuberous root | 15·35 | 7·91 | 3·41 | HCl, $H_2SO_4$, $H_3PO_4$, Fe, Al, Mn, Ca, Mg, K, Na, | 3·70 | 16·66 |
| Kola | Nuts | 1·39 | — | 2·90 | HCl, $H_3PO_4$, $H_2SO_4$, Fe, Al, Ca, Mg, K, | — | — |
| " | " | — | 10·23 | 2·32 | — | 2·58 | — |
| *Lobelia* | Herb | — | — | 5·89 | — | — | — |
| *Lycopodium* | Spores | — | — | 3·60 | — | — | — |
| *Nux vomica* | Seed | 3·10 | 7·62 | 2·10 | — | 2·27 | 3·35 |
| " " | " | 2·35 | 9·27 | 1·41 | — | 1·55 | 2·58 |
| " " | " | 2·58 | 5·81 | 1·81 | — | 1·92 | 2·73 |
| *Pilocarpus* | Leaflets | 0·10 | 6·30 | 10·50 | — | 11·20 | 0·11 |
| " [1] | " | 0·36 | 8·75 | 6·59 | — | 7·22 | 0·39 |
| Piscidia Erythrina | Bark | — | 7·37 | 9·72 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, | 10·49 | — |
| *Podophyllum* | Rhizome, rootlets | 3·65 | 7·28 | 4·41 | — | 4·75 | 3·93 |
| " | " | 3·95 | — | 4·48 | — | — | — |
| *Prunus Virginiana* | Bark | — | 7·54 | 3·49 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, Na, | 3·77 | — |
| *Rhamnus Purshiana* | " | — | — | 5·20 | — | — | — |
| " " | " | — | 6·64 | 7·19 | $H_2PO_4$, Fe, Al, Mn, Ca, Mg, K, | 7·70 | — |
| Ruta | Herb | — | 8·10 | 10·82 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, Na, | 11·77 | — |
| Sabadilla | Seed | — | 8·64 | 4·71 | $H_2SO_4$, $H_3PO_4$, Fe, Al, Ca, Mg, K, | 5·15 | — |

[1] Not true Jaborandi; sold as "so-called" Jaborandi.

| Name of Drug. | Part of Plant Used. | Per Cent. of Active Principle or Extract. | Per Cent. of Moisture. | Per Cent. of Ash. | Constituents of Ash. | Per Cent. of Ash. (Calculated in Dry Substance.) | Per Cent. of Active Principle or Extract. (Calculated in Dry Substance.) |
|---|---|---|---|---|---|---|---|
| *Sanguinaria* | Rhizome | 0·68 | 7·05 | 3·20 | — | 3·44 | 0·73 |
| " [1] | " | 1·48 | — | 5·20 | — | — | — |
| " [2] | " | 1·12 | — | 4·54 | — | — | — |
| " | " | 0·47 | 12·39 | 2·69 | — | 3·07 | 0·54 |
| " | " | — | — | — | — | 5·01 | 1·18 |
| " | " | 0·35 | 8·74 | 3·42 | — | 3·74 | 0·38 |
| " | " | 0·70 | 9·11 | 3·23 | $H_2SO_4$, $H_3PO_4$, Fe, Al, Mn, Ca, Mg, K, | 3·55 | 0·83 |
| " [3] | " | 1·13 | 7·39 | 5·67 | — | 6·12 | 1·22 |
| " | " | 0·68 | 8·31 | 3·17 | — | 3·45 | 0·74 |
| " | " | 0·68 | 8·41 | 2·95 | — | 3·22 | 0·74 |
| " | " | 1·00 | 8·40 | 3·20 | — | 3·49 | 1·09 |
| " | " | 0·94 | 8·10 | 3·19 | — | 3·47 | 1·02 |
| Sanguis Draconis | Resin | — | — | 2·00 | — | — | — |
| *Santalum Rubrum* | Wood | — | 5·10 | 10·17 | HCl, Fe, Ca, Mg, K, Na, | 10·71 | — |
| *Sarsaparilla* | Root | — | 4·36 | 10·06 | — | 10·46 | — |
| *Senega* | " | — | — | 3·11 | — | — | — |
| " | " | — | 8·80 | 2·69 | — | 2·95 | — |
| *Sinapis Nigra* | Seed | — | — | 4·27 | — | — | — |
| " " | " | — | — | 5·30 | — | — | — |
| *Stramonii Folia* | Leaves | 0·36 | 7·53 | 20·56 | — | 22·23 | 0·38 |
| " *Semen* | Seed | 0·30 | — | 2·82 | — | — | — |
| *Taraxacum* | Root | — | 12·11 | 3·95 | HCl, $H_3PO_4$, Fe, Al, Mn, Si, Ca, Mg, K, Na, | 4·49 | — |
| *Tragacantha* | Gum | — | 11·06 | 2·48 | — | 2·79 | — |
| " | " | — | 11·06 | 2·27 | — | 2·55 | — |
| " | " | — | 10·66 | 2·67 | — | 2·98 | — |
| Trifolium Pratense | Flowering Tops | — | 7·57 | 7·60 | HCl, $H_2SO_4$, $H_3PO_4$, Fe, Al, Mn, Ca, Mg, K, Na, | 8·22 | — |
| *Ulmus* | Bark | — | — | 7·64 | — | — | — |
| " | " | — | 9·95 | 7·60 | — | 8·44 | — |
| " | " | — | 8·28 | 6·99 | — | 7·62 | — |
| " | " | — | 9·60 | 8·02 | $H_2SO_4$, HCl, $H_3PO_4$, Fe, Al, Mn, Ca, Mg, K, Na, | 8·87 | — |
| " | " | — | 12·35 | 7·52 | — | 8·58 | — |
| *Veratrum Viride* | Rhizome, rootlets | 1·90 | 9·20 | 10·63 | HCl, $H_3PO_4$, Fe, Al, Si, Ca, Mg, K, Na, | 11·70 | 2·09 |
| *Xanthoxylum* | Bark | — | 7·81 | 6·32 | HCl, $H_3PO_4$, Fe, Al, Ca, Mg, K, Na, | 6·85 | — |

[1], [2], [3] Specimens collected by the author.

sition to verify or add to the figures here given may be interested enough to contribute additional data.

The general arrangement has been made alphabetical, the official drugs being distinguished by printing them in italics, using the pharmacopœial titles.

The present contribution contains all of the estimations made by the author to date, the lack of uniformity in many respects being due to an imperfect knowledge of what was required when the work was begun.

Those which are incomplete are merely included for comparative effect, and duplications will be made in every case, and, in the future, only those results will be published which are complete as regards the per cent. of ash, per cent. of moisture in the air-dried drug and qualitative examination of ash.

The ash estimations were made in a platinum crucible in the usual manner; the moisture was estimated by drying about 5 grammes to a constant weight at 110° C. In certain cases the alkaloidal or extractive value is included, but this is merely for the purpose of general comparison; the processes used for the estimation of such constituents are at all times obtainable upon application to the author, as a detailed record is kept of all estimations made.

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## FLORES DATURÆ ALBÆ.

By J. B. Nagelvoort.

The task of investigating the alkaloidal strength of the flowers of Datura Alba, L., was undertaken after reading the article by Mr. Van der Wal, in *Nederlandsch Tijdschrift voor Pharmacie*, 1895, and reproduced in the *Bulletin of Pharmacy*, 1896, p. 153.

It was my intention to go a step further and extend Van der Wal's experiments over the Solanaceæ, then Atropa and Hyoscyamus, on which he reported, and to begin with Datura.

There was not, however, as much material on hand for the work as an English analyst, Mr. Frank Browne[1] had at his disposal.

The flowers of Datura are not used in the United States save for ornamental purposes, while Browne reports that they are considerably used in China as a medicine, as well as for criminal purposes.

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[1] "Datura Alba," by Frank Browne, *Pharm. Jour.*, 1896, p 197.

It will be wise to take particular notice of this, because the Chinese element in our large cities amounts to something. Browne reports that the drug is easily administered in tea.

I might be allowed to remark that the use of Datura as a stupefying agent is practised, on a large scale, by all Asiatics, not by the Chinese exclusively.

Mr. Browne's communication, with its local color, disposes effectually of a doubt expressed in Gehe's *Berichte*, for September, 1896, p. 6. That firm state that they feel bound to call the attention of the public to the irregularity that Naou-yang-hwa is the Chinese name of a flower, which is mixed with aconite tubers, and that this mixture is used, in powder form, in surgery, to alleviate pain. Gehe further states: "Hanbury records that the above name is the Chinese vernacular for *Hyoscyamus*. Naou-yang-hwa and Nau-young-fa (*Datura*) are semi-successful European experiments to reproduce one and the same Chinese hieroglyph." This seems to be a small matter and easily disposed of. Of greater importance is what follows in the same *Berichte*, in regard to *Datura*.

Dr. Pienemann made an analysis of the seeds, of the root, and of the leaves of Datura alba according to Keller's process, so that we have now a fairly accurate knowledge of the value of this drug. Compare also a later investigation by R. A. Cripps in No. 1290, March 16, 1895, of the *Pharm. Journal*.

Dr. Pienemann has, in all probability, exhausted his plants with Prollius' fluid.

Pienemann presumed that the alkaloid he obtained was atropine; he intended to prove this by Vitali's test. He mentioned also the hypothetical "stramonine;" but Vitali's test is a test for mydriatics in general, is a group reagent, not an identity reaction for atropine only.

Above is said that not as much material could be gathered for this investigation as Browne had at his command. I had about 60 grammes of dry flowers.

Browne found in the dry flowers, Chinese growth, 0·485 per cent. of an alkaloid which he called hyoscine.

I found in flowers grown in parks in Chicago, 0·464 per cent. alkaloid by weight. I presume that Browne's figures are also obtained on the balance, and not by titration and calculation.

Of course, the coincidence of these figures is remarkable. But it

is wise not to attach too much importance to this. I assayed the flowers only once. I do not know if Mr. Browne repeated his analysis. If I had obtained a higher result than Mr. Browne, that would not have been proof that American-grown Datura alba flowers were richer in alkaloid than those collected in China. Neither could the reverse be argued if conditions differed. Let us take it simply as a contribution in favor of the original Van der Wal's investigation, and deduce a recommendation to our U. S. P. Revision Committee from it. When the article, Stramonii folia, is revised for the eighth decennial revision, I would like to see it read "Herba Stramonii, collected in blossom," instead of folia S., so as not to throw away the most valuable part of the plant any longer.

*Assay.*—The flowers, after being dried without the application of any artificial heat, were reduced to a fine powder. Fifty grammes of this air-dry powder was exhausted by percolation with alcohol of 90 volume per cent. Exhaustion was proved according to analytical rules. Alcohol was recovered *in vacuo.* Residue was taken up with acidulated water ($H_2SO_4$), whereby all the waxy and resinous matter was left behind. The aqueous fluid, which was carefully kept to a small amount, was, in a separator, thoroughly washed with chloroform, the latter removed. The fluid was made alkaline with ammonia water, agitated again with chloroform. This was collected and the operation repeated to exhaustion. The chloroform was evaporated spontaneously. The residue was dissolved in acidulated water, because the alkaloid was not pure enough, washed with chloroform; the acid fluid being made alkaline again, yielded to chloroform an amorphous, nearly colorless residue, which, being dried over sulphuric acid to constant weight, weighed 0·232 gramme, or 0·464 per cent. This was dissolved in very diluted hydrochloric acid, precipitated with gold chloride, the precipitate dissolved in slightly acidulated (HCl) water and recrystallized from boiling water. The crystals thereby obtained had the form published on page 67 of Flückiger's Reaction, American edition. "Hyoscin goldchloride." Dried over $H_2SO_4$ *in vacuo.* M.p., 5 determinations, *192° C.*

Atropine goldchloride has a melting point of 137°, Hyoscyamine goldchloride a melting point of 160°.

An extract of the flowers of Datura alba, was free from that large amount of oil that bothers one so much in Sol. Ex. Sem. Stramonii, U.S.P.

Will the Revision Committee take it kindly under consideration to replace stramonium seed with 20 per cent. useless fat, by stramonium flowers with hardly any?

Will a colorless petrolatum preparation of those flowers not make an elegant substitute for the unsightly ointment?

I want to see retained in our U.S.P. the very useful Datura. The flowers are stronger than the seed.

*Conclusion.*—I have made arrangements to repeat this examination on a larger scale, in the fall of 1897, and will plant a vacant lot next to my laboratory with Datura alba.

Mr. Frank Browne concluded that he obtained hyoscine, goldchloride, m.p., 198°. This will have to be verified also, but material is lacking now. The reader interested herein is referred to the works of E. Schmidt, Max Biechele, Hager, Fisher and Hartwich, and especially to Blythe on "Poisons, their Effects and Detection," London, 1895, p. 376.

School of Pharmacy, Northwestern University.

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## HEAT OF BROMINATION AS A MEANS OF IDENTIFYING FATS AND OILS.

By Wm. Bromwell, Ph.D., and Joseph L. Mayer, Ph.G.

A contribution from the Chemical Laboratory of the Brooklyn College of Pharmacy.

Among other work required of the students in the Brooklyn College of Pharmacy in the course in analytical and applied chemistry, is the examination of fats and oils, with a view to identifying them and their adulterants.

In addition to the regular color tests, we had been employing Maumené's method of identifying them by the rise in temperature produced on the addition of sulphuric acid.

This method is a good one in the hands of an expert analyst, but our experience with the students here proved it was not the method for pharmacists; it is somewhat unsatisfactory and the results not always regular and concordant, so much so that Professor Bartley suggested that Professor Bromwell and myself adopt Hehner and Mitchell's method of recognizing them by the rise in temperature produced on the addition of 1 c.c. bromine to 1 gramme of oil, and that the table published by them be extended so as to include as many other fats and oils as could be obtained.

This method, which is quite recent (having been introduced to the chemical world through the *Analyst*, July, 1895), depends for its action on the fact that the oils are natural glycerides containing unsaturated radicals capable of combining with the halogens.

This fact had been taken advantage of by Hübl, whose iodine absorption method is so well known that it needs but to be mentioned. Fawsitt (*Journal Society Chemical Industry*, 1888) tried to utilize the heat evolved by sulphur chloride ($S_2Cl_2$), but not with sufficient success to make it popular.

To prevent as far as possible loss of heat by radiation, Mitchell and Hehner used Professor Dewar's vacuum jacketed tube, which he had employed in his experiments with liquefied air. It is a small inner tube soldered at the neck to a larger outer tube, from which the air is practically exhausted, leaving almost a perfect vacuum and consequently making it a non-conductor of heat.

The expense of such a tube determined us to make our experiments with a cheaper apparatus, so that our method could be applied and our results obtained at any time or place without special apparatus.

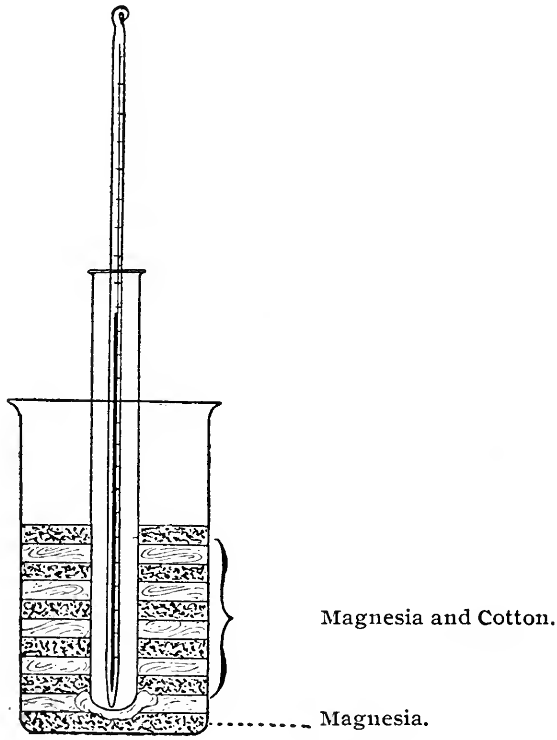


FIG. 1.

The apparatus we adopted consisted of a larger beaker (a graduate or other glass vessel will do when a beaker is not at hand), with about one-fourth of an inch of calcined magnesia in the bottom, a test tube about 7 inches in length, around the bottom of which was wrapped a small piece of cotton; it was then put in the beaker and imbedded in alternate layers of cotton and calcined magnesia, being packed quite tightly so that the tube could be withdrawn and replaced at will without disturbing the nest so made.

A Centigrade thermometer graduated to fifths of a degree completed the apparatus, which, when ready for use, presented the appearance shown in *Fig. 1*.

Mitchell and Hehner added the bromine directly to the oil, but the difficulty of conveniently handling 1 c.c. of it was recognized by Dr. Wiley (*Journal American Chemical Society*, April, 1896), who suggested that it be diluted with chloroform.

Acting upon his suggestion, we diluted in the proportion of 1 c.c. of bromine to 4 c.c. of chloroform.

The action of the bromine on some of the oils being so violent, we diluted or dissolved them in chloroform in the proportion of 6 grammes of oil and made up to 30 c.c. with chloroform. We made up this quantity, so that we might conduct a number of determinations on each oil without having to prepare a fresh solution for each determination.

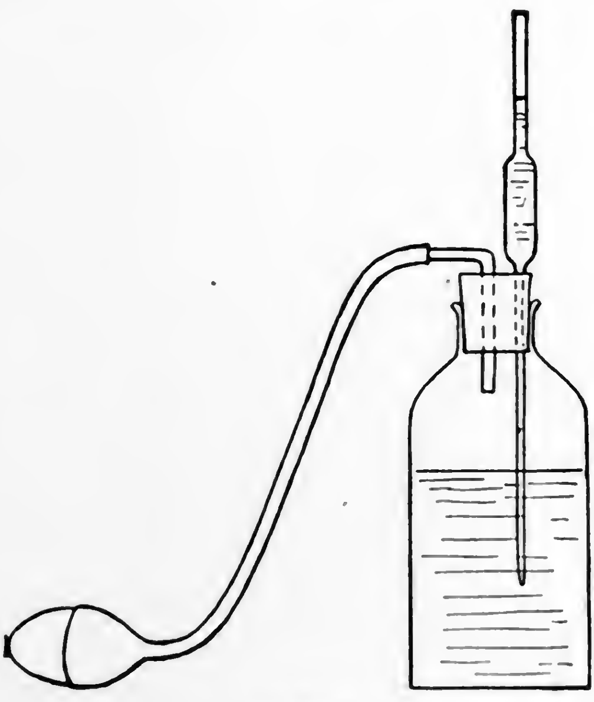

FIG. 2.

Of the chloroform bromine solution, we made up enough to last for one day's work, fearing that the action of the bromine on the chloroform might, in due time, generate hydrobromic acid, which would interfere with the results.

It is of great importance to accurately measure the 5 c.c. of oil solution; this is best accomplished by using a glass-stopped burette, care being taken to avoid any loss by contact with the walls of the tube during the flowing in.

In the oil solution a thermometer is inserted, to see that it has the same temperature as the bromine solution; if such is not the

case, it must be brought to the same temperature. As the action of the bromine on the oil is instantaneous, it is necessary to have the thermometer in the oil solution before adding the bromine.

The bromine being largely in excess of the amount required, the 5 c.c. of the solution need not be so accurately measured; we adopted Dr. Wiley's apparatus for measuring it (*Fig. 2*).

It is simply a wash bottle arrangement; through one opening in the stopper a pipette (graduated on the stem to 5 c.c.) passes nearly to the bottom, through the other a short tube which connects on the outside with an atomizer bulb; by pressiug this bulb the solution is forced up in the pipette to the 5 c.c. mark; the index finger is then used to close the top, the stopper and tube are withdrawn from the bottle, the point of the pipette directed into the oil, and, the finger being withdrawn, the solution flows in.

Our experiments proved that if the solution was allowed to run in very quickly the temperature would be reduced, in some instances, 2°, there being much ebullition, which would throw the hot liquid against the cold sides of the tube and thus reduce the temperature; this result was also brought about by stirring the mixture with the thermometer. We would, therefore, recommend that the bromine solution be slowly run in, consuming about a half minute in adding it. The figures in the table are the results of four determinations on each oil, the average of these being given.

In making the tests we had in use about twelve of the beaker test tube apparatus, so that after making the four tests the tubes were withdrawn from the nests, washed out with petroleum benzine and inverted so that they would dry. For the next set of tests we took four more tubes and beakers, and so on, until we had used all; we then come back to the first set, having them, in the meantime, cleaned, and the temperature of the nest reduced to that of the room.

Experiments made with a beaker with cotton loosely packed, without any magnesia, proved that in this way the temperature was also considerably lowered.

In the table will be found Hehner and Mitchell's figures for the oils on which they worked. There will also be found Dr. Wiley's, who worked on a few oils in the laboratory of the Washington Bureau of the Department of Agriculture.

We are still at work on this subject, and hope in our next paper to give a factor which, when multiplied by the rise in temperature of the oil, will approximately give Hübl's iodine number.

We would also take this opportunity to thank the members of the Class of 1897 for valuable assistance rendered us, under our supervision and direction.

The oils were all supplied gratuitously by the dealers mentioned in the table, and were supplied as the purest obtainable. For their kindness and promptness in complying with our request, our thanks are due.

| Name of Oil. | Rise in Temperature. | Average Rise in Temperature. | Dr. Wiley's Figure. | Hehner and Mitchell's Figure. | General Remarks. | From Whom Procured. |
|---|---|---|---|---|---|---|
| Sweet almond | 20·0° –21·0° | 20·25° | — | 17·6° | — | Lehn & Fink. |
| Butter | 9·5° –10·0° | 9·5° | — | 6·6°– 7·0° | Sweet, unsalted | T. V. Ketcham. |
| Cade | 24·5° –26·5° | 25·5° | — | — | — | Lehn & Fink. |
| Castor | 20·00°–22·0° | 22·0° | — | 15·0° | — | Seeds Preserving Co. |
| Cocoanut | 3·25°– 3·50° | 3·31° | — | — | — | Colgate & Co. |
| Cod-liver, A | 37·50°–40·0° | 36·6° | — | — | — | Martin Manufacturing Co. |
| " B | 33·5° –36·5° | 35·25° | — | — | — | Lehn & Fink. |
| " C | 33·5° –35·5° | 34·00° | — | — | — | Welles & Welles. |
| Corn, A | 24·75°–26·0° | 25·50° | — | 21·5° | — | Davis Oil Co |
| " B | 27·5° –30·0° | 28·6° | — | " | — | Chicago Sugar Refining Co. |
| Cotton, A | 24·5° –25·0° | 24·75° | 25·8° | 19·4° | Refined | American Cotton Oil Co. |
| " B | 24·0° –25·0° | 24·6° | " | " | Crude | Welles & Welles. |
| " C | 24·0° –26·0° | 25·25° | " | " | Refined | " |
| " D | 24·00°–25·0° | 24·32° | " | " | " | Lehn & Fink. |
| Croton | 25·00°–27·0° | 26·3° | — | — | — | Leo Bernard & Co. |
| Hoof | 16·00°–17·0° | 16·31° | — | — | Sold as neatsfoot | Davis Oil Co. |
| Horse, A | 28·00°–30·00° | 29·00° | — | — | Brown | Thos. F. White. |
| " B | 21·00°–24·0° | 23·00° | — | — | Yellow | " |
| Lard | 18·00°–18·5° | 18·3° | — | 9°–11·8° | — | Davis Oil Co. |
| Linseed, A | 30·25°–32·0° | 30·93° | — | 30·4°–31·3° | Raw | Dianchin Oil Co. |
| " B | 33·00°–34·25° | 33·25° | — | " " | Raw, 8 months old | National Linseed Oil Co. |
| " C | 29·5° –31·50° | 30·37° | — | " | Raw, new | " |
| Menhadden | 36·50°–38·50° | 37·3° | — | — | — | Welles & Welles. |
| Mustard | 22·5° –23·25° | 22·93° | — | — | Quite old | — |
| Neatsfoot, A | 13·00°–14·00° | 13·68° | — | — | Made from hide scrapings | Davis Oil Co. |
| " B | 16·0° –17·00° | 17·35° | — | — | — | Welles & Welles. |
| Oleomargarine | 12·00°–12·75° | 12·37° | — | — | "Oil" | Schwarzchild & Sulzberger. |
| Olive, A | 20·00°–21·00° | 20·25° | 19·5° | 15·00° | — | Turner. |
| " B | 23·00°–24·00° | 23·28° | — | — | .50 per cent. cottonseed | — |
| Palm | 13·25°–15·00° | 13·80° | — | — | — | Colgate & Co. |
| Rosin, A | 21·50°–23·00° | 22·5° | — | — | First run | J. A. Casey. |
| " B | 17·50°–19·50° | 18·5° | — | — | Second run | " |
| " C | 20·50°–20·50° | 20·5° | — | — | Third run | " |
| Sesame, A | 22·00°–24·00° | 23·0° | — | — | About ten years old | L. Arensberg. |
| " B | 22·50°–26·50° | 23·9° | — | — | Quite new | — |
| Skunk | 20·25°–22·25° | 21·00° | — | — | — | Lehn & Fink. |
| Sperm | 21·50°–23·50° | 22·1° | — | — | — | Grennel & Co. |
| Sunflower | 26·50°–28·00° | 27·0° | 28·4° | — | Old sample | — |
| Theobroma | 8·00°– 9·50° | 8·75° | — | — | — | Barker & Co. |
| Walnut | 24·00°–26·00° | 25·00° | — | — | — | Lehn & Fink. |
| Whale | 29·50°–31·50° | 30·12° | — | — | White | Swan & Finch. |

# AMMONOL.

By George M. Beringer.

The manufacturers state that "Ammonol is a product of the Amido-benzene series ($C_6H_5NH_2$). It differs essentially from the other medicinal coal-tar products, especially in that it contains ammonia in an active form and has a stimulating action on all the vital functions." Its medicinal action is claimed "to be stimulant, antipyretic and analgesic." The chemical composition is given as "Ammoniated-Phenylacetamide," but the chemical formula given on the label, "$C_6H_5NH_2$," is the accepted formula for *amido-benzene*, which is commonly spoken of as *aniline*.

The writer was induced to make an examination of this *valuable new coal-tar derivative* (?). It is a powder, having a very faint yellow color, put up in 1-ounce vials. The odor is strongly ammoniacal, and on smelling the vial one can readily detect the peculiar empyreumatic odor of commercial ammonium carbonate. On closer examination, even with the naked eye, one can detect small particles of a crystalline character, indicating imperfect comminution of a crystalline ingredient. This is the so-called *amorphous micro crystals* of the manufacturer's description.

One gramme of the powder was rubbed up with 20 c.c. of water and poured on a tared filter, and the mortar and filter carefully washed with an additional 10 c.c. of water added in small portions. After drying, the residue was a white powder, weighing ·360 gm. A portion left no ash on incinerating. On boiling with concentrated potassa solution it was converted into aniline, and with chloroform readily yielded the isonitrile reaction. From these tests, also supported by solubility and color reactions, I was led to conclude that this was pure phenylacetamide, or acetanilid. According to the U. S. Pharmacopœia, acetanilid is soluble in 194 parts of water, and so the 30 c.c. of water used would have extracted ·154 gm., and this, added to the undissolved portion on the filter, would give the total amount of acetanilid as ·514 gm., or about 50 per cent.

The filtrate was a light canary-yellow-colored solution, and, on testing, showed the presence of sodium and ammonia as carbonates.

The filtered solution of 1 gm. of ammonol in 30 c.c. of water, evaporated on the water-bath, yielded a residue of ·222 gm., and on prolonged heating, minute micaceous crystals separated and sublimed

into loose tufts on the surface. These crystals proved to be acetanilid, showing that, as stated above, it had been partly extracted by the water, and that it was more or less volatile at the temperature of the water-bath. On incineration, the residue left ·158 gm. ash, which required 29· c.c. $\frac{N}{10}$ sulphuric acid for neutralization, which, calculated for sodium bicarbonate, would be ·24317 gm.

One gm. of ammonol was incinerated, and left an ash weighing ·157 gm., which, titrated with $\frac{N}{10}$ sulphuric acid, required 30 c.c., or, calculated as sodium bicarbonate, ·2515 gm. This would indicate the presence of about 25 per cent. of sodium bicarbonate in the product, and leave 25 per cent. for ammonium carbonate.

On adding hydrochloric acid in excess to the canary-colored aqueous solution, the color is changed to a rosy pink, which is again changed to the pale yellow on adding ammonia water. With nitric acid, the color is also changed to pink, but in excess is destroyed, the solution becoming colorless, and ammonia does not again restore the original color. From these reactions I became convinced that a small amount of some aniline color had been added as a disguise, and not for medicinal action. An examination of a number of so-called aniline orange and yellow colors, for one possessing similar reactions and tinctorial properties, was made, and the dye known as *metanil-yellow* was found to give similar reactions. According to Allen (Commercial Organic Analysis, Vol. III, Pt. 1, p. 184), metanil-yellow or orange MN, is the sodium salt of diphenylamine-azobenzene-meta-sulphonic acid.

From my examination, I am compelled to conclude that "ammonol," instead of being a new "coal-tar derivative," is merely an admixture of the well-known acetanilid, sodium bicarbonate and ammonium carbonate, and that the following formula represents its real composition:

| | Grammes. |
|---|---|
| ℞ Acetanilid | 10· |
| Sodium bicarbonate | 5· |
| Ammonium carbonate | 5· |
| Metanil-yellow | 0·005 |

Mixtures of acetanilid and sodium bicarbonate, as an antacid and antipyretic and analgesic, have been in daily use by nearly every physician for at least a decade. The addition of ammonium carbonate as an arterial stimulant is not unusual, and in many cases such a mixture must undoubtedly prove serviceable. Mr. Joseph W.

England informs me that at the Philadelphia Hospital they use an ammoniated acetanilid, the formula of which is:

| | Grains. |
|---|---|
| Ammonium carbonate | 1 |
| Sodium bicarbonate | 1½ |
| Pulv. acetanilid | 2½ |

Misce.

Dose, one to three powders.

Ammonol thus appears to be another of the numerous mixtures of acetanilid that are being palmed off on the gullable physicians as new and valuable discoveries. The names published in their circulars would indicate that the Ammonol Chemical Company have been unusually successful in playing on the credulity of quite a number of prominent practitioners, and medical as well as pharmaceutical journals.

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## CHEMICAL ANALYSIS OF SAGE BRUSH, ARTEMISIA TRIDENTATA, NUTT.

By Griffith H. Maghee.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 161.

The sage brush, or sage bush, is a small shrub, 5 or 6 feet in height, which grows abundantly on the Western plains, covering hundreds of square miles on the foot-hills of Nevada and Utah, and extending from Arizona to Oregon and Sonora, and as far east as Nebraska. It does not thrive where there is an abundance of water, but rather prefers a dry, barren soil; ranchmen very often clear their ground of it by flooding with water.

When fired, it burns rapidly and with an intense heat, affording excellent fuel, and the Indians employ the smoky flame in curing or smoking their buckskins; they also use an infusion of the leaves for colds, headache and mountain fever (considered by many physicians to be a modification of typhoid fever).

The leaves and flower heads used in the present analysis were collected in Fremont County, Wyoming, at an elevation of 5,000 feet. Fifty grammes of the fine powder were used, and the usual method of plant analysis was employed, except that the drug, after extraction with alcohol, was enclosed in a strong piece of muslin and suspended in the water and succeeding solvents, with the result that a much smaller amount of liquid was necessary for complete

exhaustion, and some loss in handling the drug by the ordinary method was avoided; it also admitted of expression being employed without loss of material.

The following results were obtained:

| | Per Cent. |
|---|---|
| Moisture | 8·48 |
| Ash | 4·92 |
| Petroleum ether extract, containing volatile oil 0·84, fixed oil and fat 0·41, wax melting at 61° C. 0·61, and caoutchouc 0·26 | 2·12 |
| Ether extract, consisting of resins | 4·25 |
| Absolute alcohol extract, containing resins, glucosidal bitter principle, etc. | 3·32 |
| Water extract, composed of mucilage 3·22, glucose 0·52, extractive 4·90 | 8·63 |
| Alkali extract, containing pectin 2·74, extractive 3·36 | 6·10 |
| Acid extract | 1·14 |
| Lignin | 6·44 |
| Cellulose | 54·60 |
| | 100·00 |

The ash was composed of calcium, potassium, manganese and iron, combined with hydrochloric, sulphuric, phosphoric and carbonic acids.

The alcohol extract yielded a bitter principle by treating with acidulated water and agitating this solution with ether or chloroform, which removed the principle and deposited it, on evaporation, in an amorphous condition.

Tannin and starch were not found in the drug.

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## FLUID EXTRACTS.

By William B. Thompson.

Reasonable and well-tempered discussion on subjects in controversy ought to be improving to knowledge. The natural tendency of such would be to turn thought into new channels, or to broaden its scope in directions already pursued. Events which, at times, seem adverse and disappointing, may often be turned into fortuneate advantage. The use and *mis*-use of fluid extracts in extemporizing the preparation of the lesser galenicals, as tinctures, wines, syrups and infusions, has evoked the expression of some opinions and is likely to arouse more. It would seem to be within the con-

fines of truth to say that at least 90 per cent. of the pharmacists of this country resort, in a more or less extent, to the practice of diluting fluid extracts to form the minor preparations. That this practice would inevitably follow the advent of this class of preparations (fluid extracts) having official sanction, as well as unauthoritative origin, was obvious, and plainly foreseen at the various periods of revision, adoption and introduction. And it now has the appearance of an eleventh-hour conversion for pharmacists to criticize the natural sequence of their own acts. No protest having come from the medical profession in regard to any deficient therapeutic value of the lesser galenicals so made, may we not be straining a point or principle somewhat in making too broad a condemnation of the practice?

If the fluid extract is right exactly, and in every particular just what it should be, the addition or dilution (provided it be made without material disturbance of permanent solubility) *must be right.* There are two dilemmas and two horns! If the result of controversy should be to induce pharmacists to discriminate more intelligently between the true and the false—between the good and the bad—much good will undoubtedly arise from a seeming evil. But that the 90 per cent. of pharmacists can be induced by any persuasion or argument to abandon that national penchant for a short-cut to the goal, is an idea too un-American to be entertained. Had we not better wisely adapt the fluids to the dilutions?

PHILADELPHIA, February, 1897.

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## ZANZIBAR COPAL.[1]

BY A. STEPHAN.

Copal is a collective name for a number of resins that exhibit great differences in their chemical and physical properties; they may, according to the author, be arranged in the following groups:

(*a*) East African, probably derived from Trachylobium mossambicense and Hymenea verrucosa.

(*b*) West African, said to be obtained from Guibourtia copallifera, or from species of Copaifera.

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[1] *Pharmaceutical Journal*, December 19, 1896.

(*c*) Kauri copal from New Zealand, the botanical origin of which is Dammara australis.

(*d*) Manilla copal, obtained from Vateria indica.

(*e*) South American copal, derived from Hymenea coubaril, H. stilbocarpa, Trachylobium martianum, T. hornemannianum.

The first three are fossil resins, and are dug up out of the earth, whilst the last two are collected from the plants yielding them.

To the East African copals belong the following three varieties:

(1) Copal from Mozambique.

(2) Copal from Madagascar.

(3) Copal from Zanzibar.

The purity and hardness of the last variety render it the most valuable, and the principal object of the author's work was to investigate the constituents of Zanzibar copal; the details that follow relate, therefore, to that variety only. This must be emphasized, because many statements are met with without any mention of the variety of copal to which they refer.

From Bagamoyo, in East Africa, the author received raw (unwashed) copal, pure copal, and specimens of the tree yielding it. The resin is brought down by the natives to Kiboa from districts from the coast; the botanical specimens came from Usegna, which lies inland westward from Bagamoyo. The commercial resin, obtained from a German firm, agreed in its characters with the genuine specimens sent from East Africa.

Zanzibar copal, finely powdered, melts at about 140° C.; it is slowly but completely soluble in alcohol; benzol, chloroform and glacial acetic acid dissolve about 30 per cent., ether about 34 per cent., petroleum spirit and carbon bisulphide about 10 per cent.

When boiled with alcohol the resin caked, and only a slight proportion dissolved, but by repeated digestion with alcohol it could be brought entirely into solution and precipitated with water. The resin thus purified was more soluble in the menstrua previously mentioned, and dissolved also in boiling very dilute solution of potash (0 1). All attempts to separate it into other constituents were unsuccessful, nor could it be saponified. It appeared to consist of resin-acids, the principal of which, constituting about 80 per cent. of the resin, was called trachylolic acid. This acid could be obtained with difficulty in minute sphæro-crystalline masses, melting at 168° C. From it the potassium, copper and iron salts were pre-

pared. A second acid, present to the extent of about 4 per cent. only, was also obtained; to this the name isotrachylolic acid was assigned. These two acids, together with about 6 per cent. of $\alpha$-copal resin and $\beta$-copal resin, a bitter principle and volatile oil, form the constituents of Zanzibar copal as far as the author could succeed in separating them.

An examination of the stems sent from Usegna showed that, although the primary cortex contains schizogenous secretion ducts, these are soon thrown off as the secondary cortex is produced, and in the bark of older twigs and of the stem no ducts could be found. The resin appears, therefore, to the author to be a pathological product.

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## RECENT LITERATURE RELATING TO PHARMACY.

### ASSAY OF JOHORE GAMBIER.

W. O. Richtmann (*Pharmaceutical Review*, **15**, 27) has examined six specimens of Johore gambier obtained by the University of Wisconsin from the Columbian Exposition. The tannin was estimated by the process recommended by the Commission of German Technical Chemists and published in 1885; the catechin was determined by extracting it from the aqueous solution of the gambier, and the ash and moisture according to the usual methods. The following are the results in per cent.:

| Specimen No. | Moisture. | Ash. | Tannin. | Catechin. |
|---|---|---|---|---|
| 2,900 | 12·37 | 4·35 | 39·63 | 11·10 |
| 2,901 | 11·20 | 3·63 | 32·51 | 9·22 |
| 2,902 | 1·38 | 3·65 | 40·51 | 9·39 |
| 2,904 | 1·50 | 1·87 | 46·95 | 5·25 |
| 2,905 | 8·37 | 3·77 | 22·21 | 8·68 |
| 2,906 | 7·00 | 4·13 | 29·94 | 6·98 |

The presence of two fungi, Penicillium glaucum and Aspergillus niger, was demonstrated.

### ON THE SEPARATION OF NITRATE OF COPPER FROM NITRATE OF SILVER IN THE MANUFACTURE OF CAUSTIC.

C. J. H. Warden (*Pharmaceutical Journal*, January 23, 1897) gives the following method for separating these two salts: It is not generally known that strong nitric acid precipitates nitrate of silver from concentrated aqueous solutions, and this action has been used

in the manufacture of caustic at the Calcutta Medical Depot. The silver employed always contains a certain amount of copper, and after solution of the metal in nitric acid and separation of the gold, as much as possible of the nitrate of silver is crystallized out, and the deep blue mother liquor evaporated to dryness. The dry salt is then powdered and placed in a glass funnel, stopped with a plug of asbestos, and percolated with strong nitric acid, specific gravity 1·42. The nitric acid dissolves the whole of the nitrate of copper, leaving the nitrate of silver perfectly white, while only a very small amount of the latter salt is dissolved. The nitric acid can, of course, be recovered by distillation, and the small amount of nitrate of silver separated from the nitrate of copper by precipitation with salt, and, when sufficient has accumulated, reduced to the metallic condition by one of the usual methods. In preparing nitrate of silver by crystallizing out the salt, a point is reached when the mother liquor is too highly charged with nitrate of copper to permit of a sufficiently pure silver salt separating by crystallization, and this impure or "blue nitrate of silver" has hitherto been returned to the mint.

By the adoption, however, of the method above described, these residues can be worked up and nearly the whole of the silver obtained in the form of nitrate, and as the nitric acid can be recovered the process is decidedly economical, while it affords a salt practically free from copper.

## TONKA BEANS.

The following information concerning this drug is furnished by Superintendent J. H. Hart, of the Royal Botanic Gardens, Trinidad, in the *Bulletin of Miscellaneous Information* for January, 1897, p. 11.

The tonga, tonquin or tonka bean is the product of a tree known to botanists as Dipterix odorata, Willd., and less frequently as the Coumarouna odora of Aublet. The latter, however, is given in the Kew Index as the *nomen prius*.

The tree thrives well in Trinidad when planted in shady, damp situations, and is very abundant in the forest of the neighboring mainland of Venezuela. The fruit or seed ripens in June and July, and in these months large shipments are received in Trinidad from South American ports. In the newspaper of July 10, 1896, the arrival is reported of a consignment of 260 bags "Tonca Beans,"

by S. S. Bolivar, an Orinoco trader. The beans are sent to Trinidad for preparation for European and American markets; for this purpose they are conveyed to warehouses, where, under customs regulations, they are steeped in rum for a certain time, and are then spread on the floors in layers 9 to 12 inches in thickness, to undergo a kind of fermenting and decaying process, during which white crystals are developed on the outside of the bean. As much as £30,000 worth have been imported and reshipped during a single year. The tree grows some 60 or more feet high. It belongs to the Leguminosæ or bean family, but is one of the few members of this order that produces a single-seeded drupe-like pod, which does not open at maturity. The seed, when ripe, so soon loses its vitality that it is difficult at times to procure supplies for raising plants.

### A SOLVENT CAPABLE OF SEPARATING CODEINE FROM MORPHINE.

L. Fouquet (*Jour. de Pharm. et de Chim.*, **[6], 5,** 49) has found that morphine is insoluble in anisol in the cold, and only slightly soluble at the boiling temperature. Codeine, on the contrary, is soluble in the same solvent cold, and its solubility rapidly rises with the temperature according to the following:

| Temperature. | Morphine. | Codeine. |
|---|---|---|
| 9° | Insoluble. | 7·80 per 100, by weight. |
| 16° | " | 15·28 " " |
| 32° | " | |
| 100° | 0·95 per 100. | 164·00 " " |
| 150° | 4·80 " | |

These investigations were made with a very pure anisol, boiling at 150° C., and having a specific gravity of 0·991.

Morphine was found to crystallize in beautiful, colorless, anhydrous prisms by chilling the solution made in boiling anisol; these crystals did not melt at 120°, like the hydrated morphine, but became brown at 210°, and were converted into an oily black liquid at 247°.

It should be noted that the solubility of the codeine is increased by crystallization from anisol; since after one crystallization the alkaloid dissolves in the proportion of 10·75 parts per 100 at the temperature of 0°, whereas the proportion is only 7·80 per 100 at 9° with the codeine of commerce.

The author concluded that he could, with anisol, effect a separa-

tion of the two alkaloids when mixed, and to establish this he made a mixture of 1·044 grammes codeine and 0·710 grammes of morphine; he exhausted this with 20 c.c. of anisol at 15°, and washed the residue with 10 c.c. more of the solvent poured on the filter; after drying he found the residual morphine to weigh 0·702 grammes, corresponding to a loss of a little over 1 per cent. From these results he concluded that anisol is applicable in many ways as a laboratory solvent in toxicological investigations.

### NATIVE FOOD PLANTS OF THE COEUR D'ALENE INDIANS.

The following is taken from a "Report on a Botanical Survey of the Coeur d'Alene Mountains in Idaho," by John B. Leiberg. *Contributions from the "U. S. National Herbarium"* Vol. 5, No. 1.

The native food plants are few. The paucity of plants suitable for human food is one of the most remarkable circumstances in a region which supports such vast quantities of vegetation as does this in its forest covering. Probably, for this reason mainly, it contained only a small aboriginal population, and the only localities in which there appear to have been permanent settlements of the Indians were in the slack-water portion of the Coeur d'Alene—possibly some existed in the lower valley of the St. Joseph. The rest of the country was visited by them only in their migratory summer and fall excursions in pursuit of game and fish, with which the St. Mary and St. Joseph Valleys formerly abounded.

The most valuable food plant in the dietary of the Coeur d'Alene Indians was undoubtedly the camass (Camassia esculenta), a plant belonging to the lily family, therefore related to the onion, but lacking all trace of alliaceous flavor and smell. The esculent part of the plant is the bulb, which, in the fresh state, is of an oblong shape, seldom more than 2·5 cm. (1 inch) in diameter and 4 cm. (1¾ inches) long. It is mucilaginous, and possesses very little, if any, flavor. The flowers are bright or deep blue, and a camass meadow in full bloom, seen from an elevation, gives the impression that one is looking at a body of very clear water reflecting a cloudless sky. The lower portion of the valley of the St. Joseph, and, in particular, that of the St. Mary and its tributaries, were, before the advent of settlements, among the classic camass grounds of the Coeur d'Alenes. Here the tribe came in large numbers each sum-

mer to dig the root and to hunt the deer and elk, which roamed by the thousand in the surrounding forest, and to catch the trout with which the streams teemed. Every meadow was a camass field. The plant was so plentiful in many places that it is no exaggeration to say that in the upper St. Mary basin more than one-half of the total herbaceous vegetation in the lowlands was composed of this one species. With the advance of settlements came the utilization of the camass fields as hay meadows. This ended the existence of the plant, except as a weed in the farmers' fields, and the camass digging in the Coeur d'Alene basins, like the game, is now a thing of the past. Strangely enough, the plant seems to have been entirely absent from the North Fork areas, at least I do not know of a single locality where it occurs.

Two species of lichens, Alectoria fremontii and Alectoria ochroleuca, principally the form sarmentosa of the latter species, were eaten by the Coeur d'Alene tribe. Both are extremely plentiful at all elevations. Boiled, or rather baked, in which latter condition they were mainly used, together with venison, they become somewhat gelatinous in their consistency, and lose the bitter taste which they possess in a fresh state.

Of fruits, they had huckleberries (Vaccinium myrtilloides principally), raspberries (Rubus leucodermis and R. strigosus), blackberries (Rubus ursinus or vitifolius) and service berries (Amelanchier alnifolia). These fruits are gathered and used at the present time by the white settlers, but none are abundant in the region except the huckleberries and service berries, and these not every year. The Coeur d'Alene Indians draw no more native plant foods from these mountains. They are now mostly farmers, have large and fairly well-cultivated ranches, and find in the raising of the cereals and vegetables of civilization a far more bountiful supply of food, and much more palatable withal, than they ever obtained from the laboriously gathered camass of their mountain meadows.

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*Professor Dr. R. Kobert* has left Dorpat, Russia, and will, in future, be located at the *Brehmenschen Lungenheilanstalt* in Görbersdorf, Germany, where he will occupy the position of director. Dr. Kobert's ten years as Professor of Pharmacology at the University of Dorpat have been eminently successful ones, and many expressions of regret have been heard from those with whom he was associated.

*Dr. Hans Hermann Julius Hager* recently died at Neuruppin, Germany, at the advanced age of eighty-nine years. We hope to furnish a suitable sketch of this eminent pharmacist in our next issue, written by one of his friends.

# EDITORIAL.

## EIGHTH INTERNATIONAL PHARMACEUTICAL CONGRESS.

The General Pharmaceutical Association, of Belgium, has decided to hold the Eighth International Congress of Pharmacy in Brussels, August 14 to 19, 1897.

There will be six sections organized :

(1) Legislation and questions of professional interest, Deontology and Pharmaceutical Education.

(2) Practical Pharmacy, Pharmaceutical Chemistry and Pharmacopœia.

(3) Food.

(4) Sanitary Matters, Public Health.

(5) Microscopical, Bacteriological and Biological Researches.

(6) Toxicology.

The following questions have been suggested by the Committee of Organization to be discussed at the meetings :

(1) In the actual state of science, is it not advisable to enforce in all drugs and medicines a normal quantity of active principles?

(2) Is it not necessary to unify the modes of analysis of medicine and of their active principles? If so, what are the best ways of doing so?

(3) As a question of public safety, what are the best regulations of the practice of pharmacy?

(4) From a bacteriological point of view, what is the best system of analysis of drinking water? How far can the methods actually known, be relied upon?

(5) Has the chemist the right of preparing and selling organic essences and the substances employed in organotherapy? Which are the best ways of insuring the chemist of the value of these substances, and also of serums?

(6) Show the best ways of encouraging the manufacture of new medicines? Is it possible, in patents, to amalgamate the protection of private trade and public good? Would it not be preferable for the chemist to sell them and the doctor to prescribe them under names more appropriate to their composition?

(7) Prepare the plan of a programme of pharmaceutical studies.

In addition to these queries, the committee has offered a list of twenty subjects for papers, on which some six prizes will be awarded. Those who desire to take part in the Congress should send their names to M. Maurice Duyk, secretary, or Dr. Fernand Ranwez, president, 102 Chaussée de Wavre, Brussels, Belgium.

## AMERICAN MILK SUGAR.

Previous to the year 1890, milk sugar from Switzerland was largely used in the United States. The establishment of a large number of "creameries," however, has changed this condition of affairs materially. After making butter and cheese, milk sugar is the only by-product. The vacuum pan appears to have made this substance available to such an extent that it not only largely supplies the demand at home, but it has become a factor in foreign markets. The milk sugar manufacturers of Germany have petitioned their Government for a protective tariff, not against the Swiss product, but against that from America, which, the petitioners claim, will gain such a foothold that it will be difficult to exclude it. Consul Germain, at Zürich, says that the export of Swiss milk sugar to America has almost ceased.

# REVIEWS AND BIBLIOGRAPHICAL NOTICES.

PRINCIPLES AND PRACTICE OF AGRICULTURAL ANALYSIS. By Harvey W. Wiley, chemist of the U. S. Department of Agriculture. Volume III, Agricultural Products. Chemical Publishing Company, Easton, Pa. 1897.

The third and final volume of this valuable work has recently been completed, and occupies 665 octavo pages. The three volumes cover about 1600 pages. Volume I deals with soils and their analysis; Volume II treats of fertilizers, and Volume III of agricultural products. All are full of special information for the analyst, but the third volume appeals especially to the pharmacist. It first considers the operations of sampling, drying, incinerating and extracting, and then takes up the special processes involved in estimating sugars and starches, carbohydrates in crude or manufactured agricultural products, fats and oils, nitrogenous bodies, dairy products and miscellaneous agricultural products. The citation of authorities throughout the work has been on a liberal scale, so that one has at his command a complete view of the whole subject. There is no other book like it in the English language, and its possession is almost a necessity to every one having to do with the analysis of organic substances.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION at the Forty-fourth Annual Meeting, held at Montreal, Canada, August, 1896, also the constitution, by-laws and roll of members. Published by the American Pharmaceutical Association. Baltimore. 1896.

It is with considerable satisfaction that we note the publication of the Proceedings some three months earlier than they appeared last year. It is to be hoped that ere long they may appear within three months of the adjournment of the meeting.

The something over 500 pages of Report on the Progress of Pharmacy are a part of this volume, which will be of lasting value. Professor Diehl has made an excellent collection of abstracts, which are both readable and instructive.

The original papers are an improvement over those which have appeared in some previous volumes, although, as many of them were not thought sufficiently well of by the members at the meeting to admit of their being more than read by title, it is a question whether they should not have been curtailed somewhat or omitted altogether.

A SIMPLE METHOD OF WATER ANALYSIS, especially designed for the use of medical officers of health. By John C. Thresh, M.D. (Vic.), D.Sc. (Lond.), D.P.H. (Camb.). J. & A. Churchill, London. 1897.

What we took for a valuable work on water analysis for health officers and physicians came to an untimely end in our estimation before we passed the introduction. The claims for recognition by this book appear to be based on the use by the author of a prepared reagent, called a "soloid," whereby he is able to give the free ammonia, chlorine, nitrites, nitrates, hardness, absorbed oxygen, etc., in water, with a facility that is little short of magical. It is a kind of tablet medication applied to chemistry.

The author apologizes for this mechanical method of conducting water examinations on the score of necessity, but it strikes us that the water had

better be let alone rather than to be tested with reagents of which the so-called analyst can know nothing. A medical officer, with a case of ready-made reagents and this book, would be a dangerous man. We believe there is no better way to explain the character of the book than to quote the following test for nitrites :

"Take about 70 c.c. of the water in one of the tubes, dissolve therein 1 soloid of compound potassium iodide, add a soloid of acid sulphate and dissolve. Note whether any blue color develops within five minutes, and record whether faint, distinct, very distinct or dark blue. If no blue color develops in five minutes, nitrites are absent. The blue color, if produced, will be proportionate to the amount of nitrites present."

HANDBOOK OF STRUCTURAL FORMULÆ, for use of students. By Henry Leffmann. P. Blakiston, Son & Co. Philadelphia. 1897.

Almost every one having to do with chemistry has felt the need of a book with the foregoing title. Dr. Leffmann has, in compiling such a work, done a real service to students, and, we might add, especially to those who are interested in the relation between chemical composition and physiological action. Only alternate pages have been printed, in order to admit of the addition of new compounds and of notes. A table of elements and an index add to the completeness of the work.

PROCEEDINGS OF THE SEVENTEENTH ANNUAL MEETING OF THE NORTH CAROLINA PHARMACEUTICAL ASSOCIATION, held at Moorehead City, July 22 and 23, 1896. Raleigh, North Carolina. 1896.

The two original papers are : "Guaiacol," by E. V. Howell, and "Expenses in Comparison with Purchases of Drugs, and Expenses in Comparison with Sales of Soda Water for a Period of Ten Years," by H. R. Horne.

DES ACANTHACÉES MÉDICINALES. By Georges Dethan. Thèse ; École Supérieure de Pharmacie de Paris. 1896–97.

This is a complete illustrated monograph on the medicinal members of the natural order Acanthaceæ. The work is divided into two parts. In the first part, the author treats the members of the order in general, giving the geographical distribution, history, general morphological and anatomical characters, principles of classification, properties and uses. In the second part, the individual plants receive special treatment in regard to their morphology, anatomic structure, properties and uses. The whole comprises 192 pages of valuable reading matter, with a complete index.

ON THE TOXIC ACTION OF DISSOLVED SALTS AND THEIR ELECTROLYTIC DISSOCIATION. By Louis Kahlenberg and Rodney H. True. Reprint from *Botanical Gazette*, August, 1896.

NATIVE DRUGS OF CEYLON. By Professor Rodney H. True. Reprint from *Pharmaceutical Review*, January, 1897. Bassia longifolia constitutes the special subject of this interesting communication.

GENERAL REPORT ON A BOTANICAL SURVEY OF THE COEUR D'ALENE MOUNTAINS IN IDAHO DURING THE SUMMER OF 1895. By John B. Leiberg.

*Contributions from the U. S. National Herbarium*, Vol. 5, No. 1. Issued January 25, 1897. A number of interesting subjects are discussed concerning the Coeur d'Alene region, notably, the mineral deposits, native food plants and forest resources. Some of these we shall take occasion to notice elsewhere in this JOURNAL.

ELECTRO-GERMINATION. Bulletin No. 43. Hatch Experiment Station of the Massachusetts Agricultural College, January, 1897.

This interesting contribution shows that electricity exerts an appreciable influence upon the germination of seeds. As a result of experiment it has been found that at the end of twenty-four hours, over 30 per cent. more seeds were germinated in the treated lots than in the normal, at the end of forty-eight hours about twenty per cent., and in seventy-two hours six per cent.

CALENDAR OF THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN. Besides giving information to members and others concerning the Society, this book contains many other valuable matters of interest to the pharmacist in general.

LES DROGUES RECEMMENT INSCRITES AU CODEX. Par le Dr. Louis Planchon. I. Les Strophanthus. II. Le Cascara Sagrada. Reprints from *Bulletin de Pharmacie du Sud-Est.* 1896. These are illustrated contributions on the two drugs, from a French standpoint, and are a valuable addition to the subject.

THE JOURNAL OF PHARMACOLOGY is the title of the successor to the *Alumni Journal* of the New York College of Pharmacy. The first number makes a good start with a contribution on "The Comparative Anatomy of the Roots of Rio Ipecac (Uragoga Ipecacuanha, Baill) and Carthagena Ipecac (Uragoga Granatensis, Baill)." By Albert Schneider, M.S., M D.

PRACTICAL DRUGGIST AND PHARMACEUTICAL REVIEW OF REVIEWS is the title of a new pharmaceutical journal; it is conducted by Benjamin Lillard, 108 Fulton Street, New York.

THE PHYSICIAN'S VEST-POCKET FORMULA BOOK. Fourteenth Edition. Published by McKesson and Robbins. New York. 1897.

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## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, February 17, 1897.

The fifth of the present series of Pharmaceutical Meetings was held in the Museum of the College at 3.30 P.M. Mr. J. W. England presided. The minutes of the last meeting were allowed to stand as published.

The presentation of specimens was next in order, and the registrar called attention to the following, which were sent by Mr. E. M. Holmes, Curator of the Pharmaceutical Society of Great Britain: False Buchu, False Maranham Jaborandi, Drimys Granatensis (pepper bark), Adulterated Hellebore, Aracati Jaborandi, Ceylon Nux Vomica, Pilocarpus Microphyllus and Chinese Colocynth. On motion, it was ordered that an expression of thanks be sent Mr. Holmes for his donation.

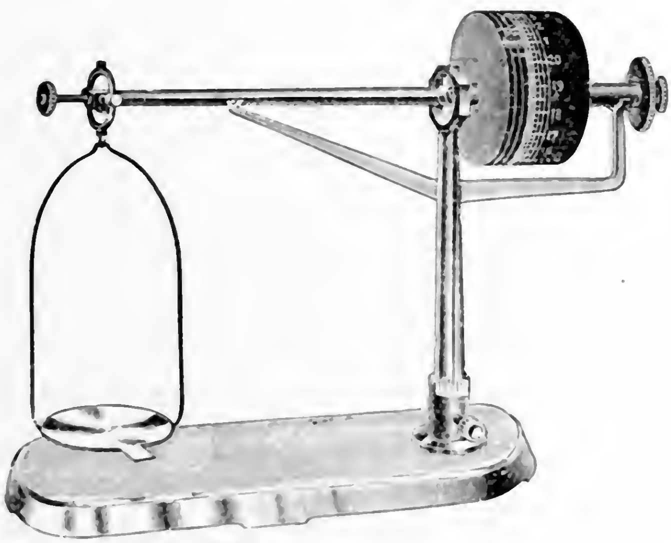
Prof. Remington reported the results of a large number of experiments in a paper entitled "Acetic Acid as a Menstruum and Solvent" (see p. 121). The

paper was accompanied by samples of liquid preparations of various drugs, and in calling attention to these, Prof. Remington said that acetic acid as a menstruum was unsuited for some drugs, but that it could be used to replace alcohol in a number of instances.

He also remarked upon the question of the cost of these solvents, and stated that an extract made with alcohol was six times as expensive as one made with acetic acid.

The subject proved to be of special interest to the retail pharmacists present, and several of them reported favorably upon its use in making preparations of such drugs as sanguinaria, ergot and gentian.

In connection with this subject, Professor Remington showed a convenient device for controlling the flow of percolates, which he recommended as much superior to the rubber tubing directed by the Pharmacopœia. The principle embodied was that of a valve regulated by a screw adjustment.



The Micrometer Balance.

A paper on "Ammonol" was presented by Mr. Geo. M. Beringer (see p. 150). Samples of ammonol from an original package and ammonol made according to a formula, which the author proposed for the compound after examination of the manufacturer's product, were exhibited, and attention directed to the complete similarity in appearance of the two products. The paper elicited considerable discussion, during which the frequency with which physicians directed ammoniated acetanilid was remarked upon.

"A Chemical Analysis of Sage Brush, Artemisia Tridentata, Nutt." was the subject of a contribution, by Mr. Griffith H. Maghee (see p. 152). The flowers and leaves were the parts examined, and in addition to the usual plant constituents, a bitter glucosidal principle was obtained, which was found difficult to separate.

The last paper on the programme was presented by Mr. Chas. H. LaWall, and was entitled, "Estimation of Ash in Various Drugs" (see p. 157). This was the first of a series of papers on this subject which the author intends to

present. Results of examinations of more than 100 samples, official and unofficial, were tabulated. If completeness in the analysis of plants is at all desirable, then the importance of such work is at once apparent, and to the future collaborators of materia medica such knowledge will prove extremely valuable.

Professor Remington called attention to a new form of prescription balance, which is manufactured by the Micrometer Balance Scale Company, of Troy, N. Y., and is illustrated by the accompanying engraving. The arms are of unequal length and there is but one pan. The knife edges are delicately adjusted and the ordinary weights are discarded. The principal feature of the device is embodied in two graduated cylinders, in combination with a screw. The inner cylinder is rigidly attached to the arm, and by moving the outer cylinder either to or from the fulcrum, weighing is accomplished, the weight being read on the index.

There being no further business, a motion to adjourn was affirmed.

T. S. WIEGAND,
*Registrar.*

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## OBITUARY.

*Auguste Trécul*, the eminent French plant anatomist, died in Paris, October 16, 1896. His most noteworthy papers pertained to the vascular system of plants. Under the auspices of the French Government he explored various regions of North America in 1848 and 1849, and many of the cactus species of European gardens, as well as the Yucca, which bears his name, were introduced by him.

On August 9, 1896, *John C. Allen* died at his home, 335 South Fifth Street, this city, in the ninetieth year of his age. He was educated as a druggist, having graduated with honor from the Philadelphia College of Pharmacy in 1829. He was elected a member of the College in 1829, and for many years was noted as being the oldest living alumnus. He was a direct descendant of Nathaniel Allen, one of the commissioners of Penn, for laying out Philadelphia.

*Henry Bower*, a well-known business man of this city, died at his late residence, 130 South Twenty-third Street, March 26, 1896, aged sixty-three years. He graduated from the Philadelphia College of Pharmacy in 1854, and after graduation, entered business as a chemical broker. Subsequently, he engaged in the manufacture of chemicals. Glycerin was one of the products made, and several years ago he received the Elliott-Cresson Medal from the Franklin Institute for the process for the utilization of crude glycerin. He was considered an authority on subjects relating to the manufacture of chemicals, and was the author of a number of articles on these subjects. He was one of the Board of Managers of the Franklin Institute and a member of the American Pharmaceutical Association.

*Henry Trimen, M.B., F.R.S., F.L.S.*, died at Peradeniya, Ceylon, October 16th, in his fifty-third year. He was appointed Director of the Botanical Gar-

den, Ceylon, in 1879, and held that position until July last, when he retired, on account of serious ill health. Dr. Trimen's administration was signalized by great success, for not only did the gardens at Peradeniya take front rank among the great botanical establishments of the world, but three volumes of the "Hand-book of the Flora of Ceylon" were completed, and the fourth and last volume was in course of preparation. The work entitled, "Medicinal Plants," he prepared in conjunction with Professor Bentley, while he was an assistant in the botanical department of the British Museum. He was also one of the authors of Trimen and Dyer's "Flora of Middlesex," and for a number of years editor of the *Journal of Botany*.

*Alfred Henry Mason, Ph.C., F.C.S., F.R.M.S.*, died at his home in New York City, November 2, 1896. His illness was only of short duration, and by his death pharmacy lost one of its most active and efficient representatives. Mr. Mason was identified with a large number of societies and scientific bodies, and had served in many of these in an official capacity, and was equally well known in professional and trade circles, not only in this country, but abroad as well. He was born at Newcastle-Under-Lyme, England, fifty-three years ago, and at an early age began his pharmaceutical career. In 1866, he became identified with the wholesale trade, and had been actively interested in this branch of business ever since. In 1892, he began his residence in New York, when he was appointed secretary of the firm of Seabury & Johnson, of that city. About a year ago he was elected secretary of the College of Pharmacy, and for five months previous to his death had been editor of the *Alumni Journal*.

*George Frederick Schacht*, a pharmaceutical chemist of Clifton, Bristol, England, died at his home, December 26, 1896, in the seventy-fourth year of his age.

Mr. Schacht was one of the best-known pharmacists in England, and, by his death, the cause of pharmacy has sustained a distinct loss, for he was not only an accomplished practical pharmacist, but was earnestly devoted to the cause of pharmaceutical education.

We quote the following from the *Pharmaceutical Journal*, of January 2, 1897: "As a pioneer of pharmaceutical advancement, Schacht will long be remembered as having originated the idea which led to the foundation of the British Pharmaceutical Conference, for his advocacy of provision being made for provincial education, and of a compulsory curriculum.

"He joined the British Pharmaceutical Society in 1842, shortly after its organization, and served it officially in one capacity or another during a number of years. He was also a member of the Bristol Pharmaceutical Association, and had long been actively engaged in connection with the University College of Bristol, of which institution he was treasurer at the time of his death." He was a corresponding member of the Philadelphia College of Pharmacy.

*Alonzo Robbins, Ph.M.*, a member of the Philadelphia College of Pharmacy, died suddenly at his home in this city, December 1, 1896. The deceased had been in ill health for more than a year, but the immediate cause of his death was an acute attack of pneumonia.

Mr. Robbins was born in Pottstown, Pa., about sixty-three years ago. He

graduated from the Philadelphia College of Pharmacy in 1855, was elected a member in 1868, and in 1878 became a member of its Board of Trustees.

After graduation he was engaged for the most part as a drug clerk until the close of the Civil War, when he engaged in the retail drug business for himself at Eleventh and Vine Streets, this city, where he remained until his death.

Mr. Robbins took an interest in all matters pertaining to pharmacy, and was an occasional contributor to this JOURNAL. He did considerable work in connection with the formation of the pharmaceutical laws of this State, and when the Board of Pharmacy was appointed, became, on June 23, 1887, its first president. This position he held until May, 1895, when he resigned.

No small share of credit was due him for his efforts in helping to found the Pennsylvania Pharmaceutical Association, of which he was a member. He was also a member of the American Pharmaceutical Association.

He was a member of the Committee of the Philadelphia College of Pharmacy for carrying on work for the Revision Committee of the 1880 Pharmacopœia. His subject was fluid extracts, and he performed a large number of experiments for determining the most satisfactory formulæ for these preparations.

*Theodore George Wormley, M.D., Ph.D., LL.D.*, a member of the Faculty of the University of Pennsylvania, died at his home, in this city, January 3d, 1897, after an illness of about two months.

Prof. Wormley was born at Wormleysburg, Pa., in 1826. His collegiate training began at Dickinson College, Carlisle, Pa., where he spent several years, but left before the completion of his course in order to enter the Philadelphia College of Medicine, from which institution he graduated in 1849.

After graduation Dr. Wormley was engaged in the practice of his profession, first in Carlisle and then in Columbus, O., until 1852, when he was appointed professor of chemistry and the natural sciences in Capital University of that city, which position he held until July, 1865. In 1854 he received the appointment of professor of chemistry and toxicology in Starling Medical College, of the same city, and retained the position until 1877, when, in June of the latter year, he was chosen successor of Dr. Robert E. Rogers as professor of chemistry and toxicology, in the department of medicine of the University of Pennsylvania, which position he held until his decease.

During his professional career Dr. Wormley held many other positions of honor and trust, calling into account his abilities as a chemist and scientist. He was a member of a number of scientific bodies in this country and a Fellow of the Chemical Society of London.

His scientific papers were numerous, and quite a number of these were published in the AMERICAN JOURNAL OF PHARMACY. As long ago as 1870 a very valuable article of his, entitled "A Contribution to Our Knowledge of the Chemical Composition of Gelsemium Sempervirens," appeared in its columns. His last contribution to its pages was in 1894, on the subject of "Some Tests for Quinine."

His most notable work was his book, "Micro-Chemistry of Poisons," which was extensively reviewed by Professor Maisch in the September, 1867, number of this JOURNAL and needs no comment here, other than to say that its value as a standard authority is recognized throughout the world.


Parthenium Hysterophorous. Flowering branch, three-quarters natural size.
At side, flower heads about twice natural size.

THE AMERICAN
JOURNAL OF PHARMACY

*APRIL, 1897.*

# PARTHENIUM HYSTEROPHOROUS.

By H. V. Arny, Ph.G., Ph.D.

The *Pharmaceutical Journal and Transactions*, in its issue of May 30, 1885, called the attention of the pharmaceutical world to this "common weed of Jamaica," quoting from *La Cronica Medico-Quirurgica*, of Havana, the physiological experiments of Dr. Jose R. Tovar with a so-called alkaloid, which he named parthenine, obtained from the plant. Another reference to the body parthenine is found in *Pharmaceutical Journal*, June 26, 1886, where the investigations of M. Guyet, as reported to the *Société de Thérapeutique* of Paris, are set forth. The next reference to the plant is found in *Merck's Bulletin*, October, 1888, where an alkaloid, discovered in the plant by Dr. Carlos Ulrici, and called parthenicine, is described.

At this point the writer undertook an investigation of the plant as a graduation thesis, and as reported in Am. Jour. Pharm. (1890, p. 121) no evidences of an alkaloid were found. The alcoholic extract, however, yielded a body which was supposed to be a glucoside.

Believing that the plant, one of the most common weeds of Louisiana, may have a future, and realizing that its active principle might prove interesting chemically, investigations were resumed with general results herein stated.

## BOTANICAL CHARACTERISTICS.

Parthenium hysterophorous is a composite plant, sub-order Tubulifera, with radiate heads, pistillate rays and sterile disc florets. It is a pubescent annual, having diffuse stem, pinnatifid leaves, with linear toothed lobes and prominent nervature (*Frontispiece*).

Its heads are loosely panicled with involucre of five ovate scales, arranged in two rows, (*Fig. 1*). There are in each head five ray florets in a single row, each resting within an oval chaffy scale which is hairy above, and which, on separating, usually divide in three portions. The ray florets are short, pistillate, ripening to smooth, compressed achenia, with pappus composed of oval scales (*Fig. 2*).

The disc florets are tubular, five-toothed and sterile, having syngenesious anthers producing pollen grains, which are prickled similarly to those of malva. Those nearest the ray florets are attached in pairs to each of the chaffy scales mentioned above (*Fig. 3*). Each

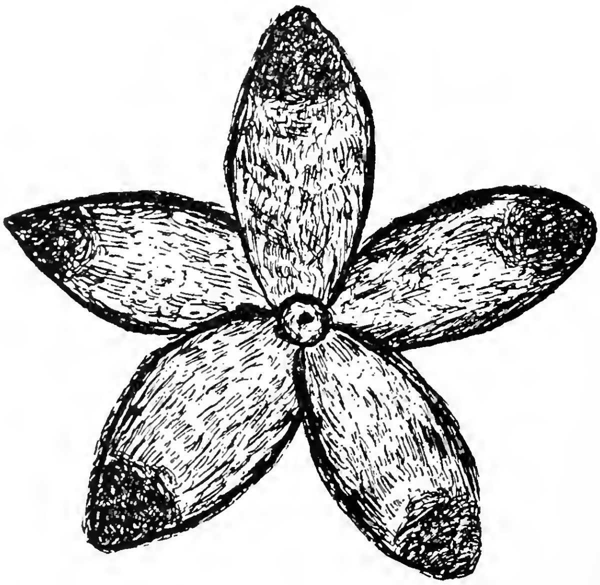

*Fig. 1.* Parthenium Hysterophorous. Outer involucre, magnified twenty diameters.

inner floret has its own chaffy scale, which is more narrow than those on the outer rim. The receptacle is conical and not very prominent.

The plant commonly called Bastard Feverfew grows in the West Indies (where it is known as Escoba amargo), in Florida and in Louisiana. It has been introduced in Europe as *Absinthe sauvage des Antilles.* It attains the height of three feet, possesses a peculiar heavy odor, while the leaves and flowers have an intensely bitter taste.

The anatomy of the active part of Parthenium hysterophorous is simple. The chaff is composed of longitudinally elongated cells in

single layers, through which pass branching fibro-vascular bundles, the prominent constituent of which are spiral ducts. The scales terminate in a mass of hairs composed of two to four cells, of which the terminal one is the largest. The cells of the corolla of the disc florets are more symmetrical than those of the chaff, the vascular system is identified by the spiral ducts. The walls of the

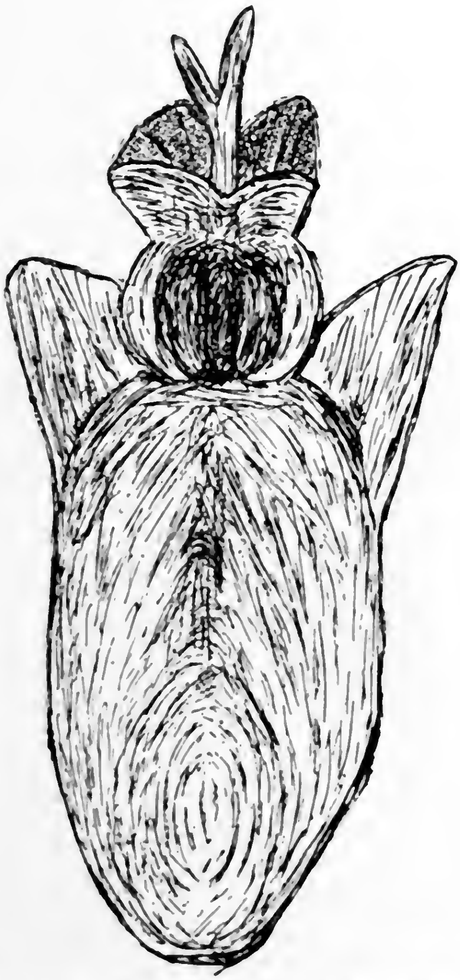

*Fig. 2.* Ray floret, magnified about forty-eight diameters.

anther cells possess reticulate markings which are quite characteristic. The pollen grains, as mentioned above, are prickled (*Fig. 4*). A cross-section of a leaf lobe shows the prominence of even the secondary veins. These project chiefly on the under side. The closed fibro-vascular bundle is bi-collateral. The lower half of the leaf is of spongy parenchyma, while the upper consists of a palisade layer (*Fig. 5*). The epidermis of the under side is interrupted by

stomata and beset with several-celled tapering hairs (*Fig. 6*). The important characteristics of the powder are the prickled pollen

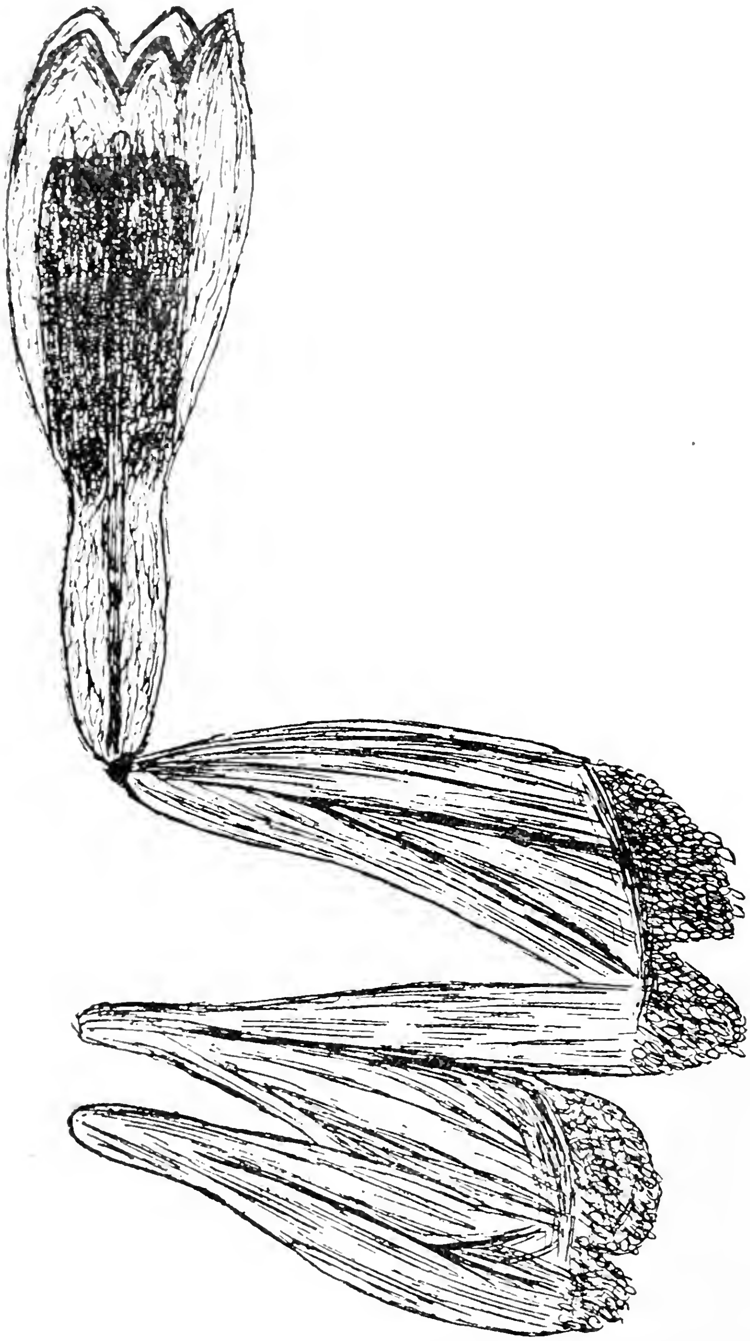

*Fig. 3.* Outer disc floret, attached to chaff, magnified about forty-eight diameters.

grains, the hairs and longitudinally striate tissue of the chaff, the tapering hairs of the leaves, the reticulated anther walls and numerous spiral cells of various sizes (*Fig. 7*).

CHEMICAL COMPOSITION.

The writer's analysis of the plant in 1889 showed, beside such normal plant constituents as starch, wax, gum and mineral salts, the presence of an active principle to which the bitterness of the plant is due. It was obtained from the alcoholic extract of the drug by

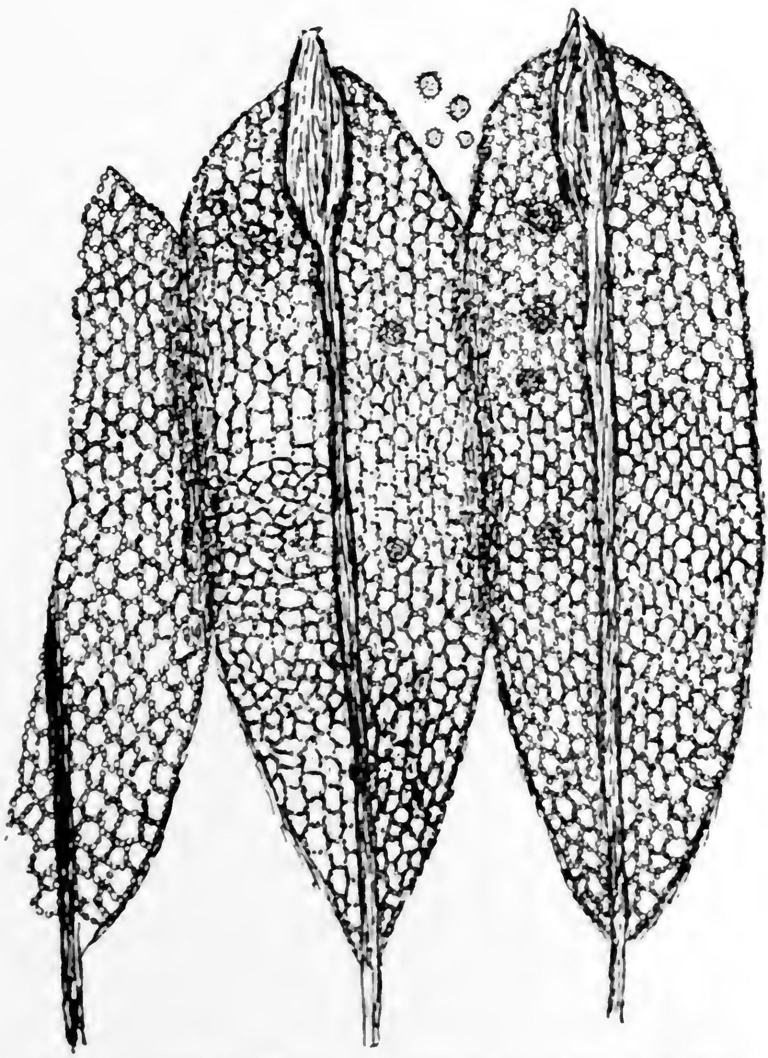

*Fig. 4.* United anthers, magnified about 150 diameters.

evaporation to dryness, solution in water and extraction by agitation of the aqueous liquid with chloroform, and is supposed to correspond to the parthenine of Tovar, as well as to Ulrici's parthenicine, all the products being in a more or less impure form. Tovar's original article has not yet been procured, despite efforts in that direction, and the reference in the *Pharmaceutical Journal* gives no inkling

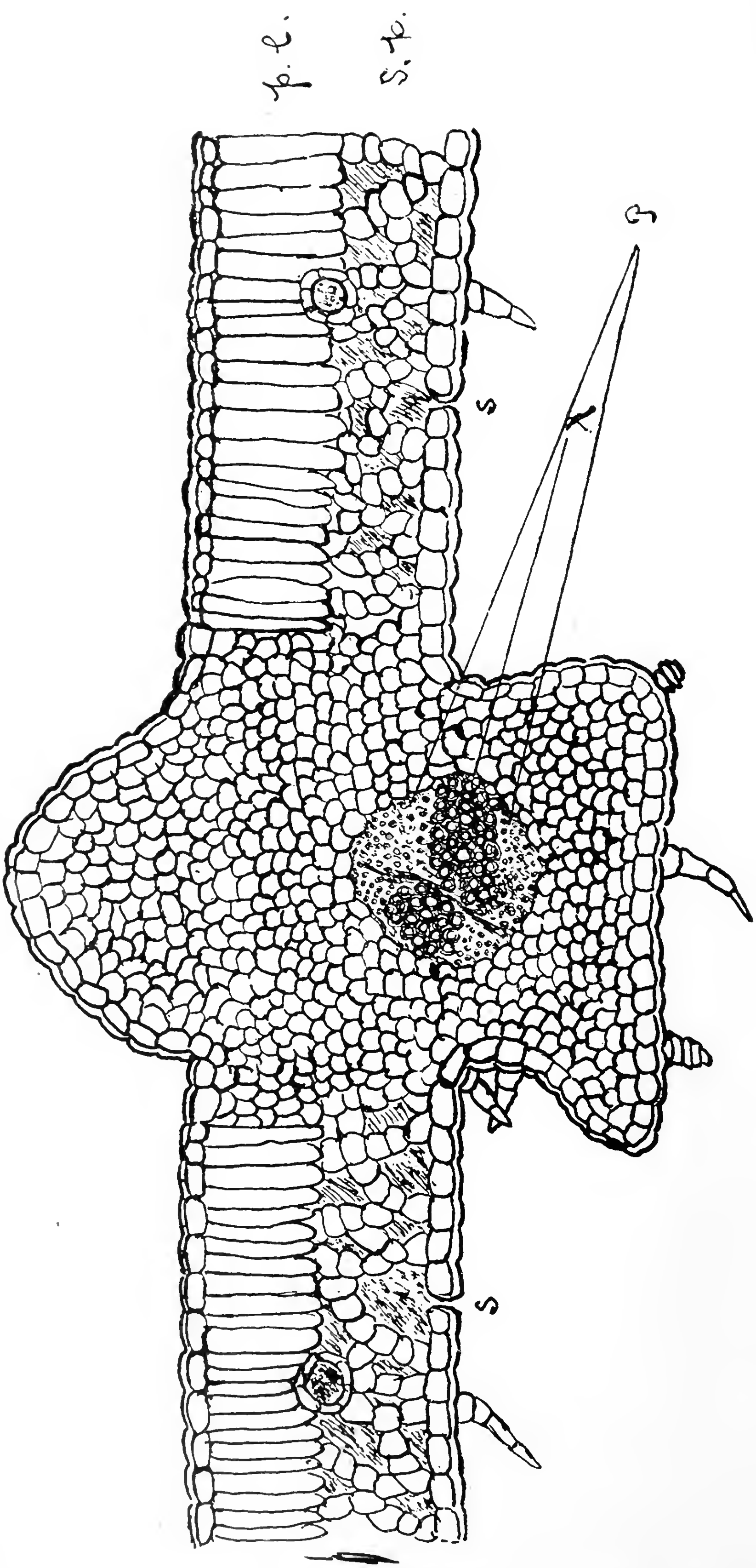


*Fig. 5.* Cross section of leaf, magnified about 600 diameters. *p. l.*, palisade layer; *s. p.*, spongy parenchyma; *s*, stomata; *x*, xylem; *p*, phloem.

of the mode of preparation. Guyet's paper, as reported in full in *La Cronica Medico-Quirurgica*, of Havana, is a *résumé* of the chemical researches of Ulrici, with an account of the therapeutical properties of the drug, as deduced by the author of the article. Ulrici obtained from the plant black shining scales, from an alcoholic solution of which he separated, by means not stated, a white amorphous residue which crystallized in fine needles.

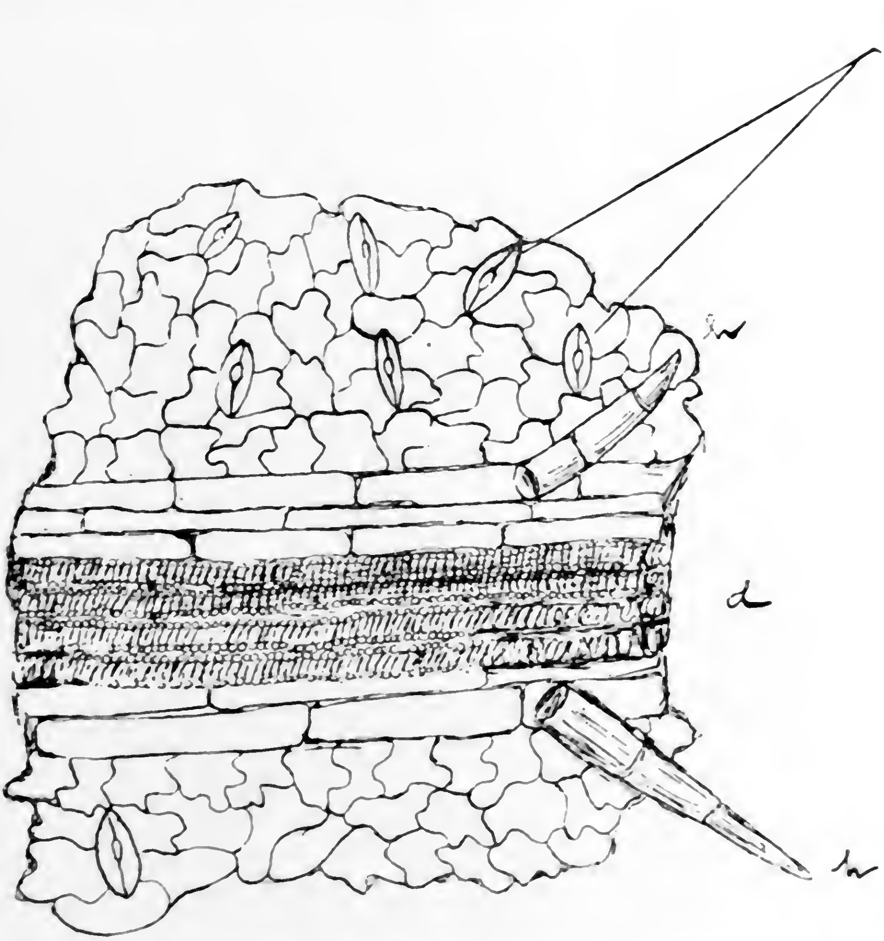


*Fig. 6.* Under surface of leaf, magnified about 600 diameters. *s*, stomata ; *h*, hairs ; *d*, spiral ducts.

He then dissolved another portion of the black scales in water, cleared of coloring matter by slight excess of potassa and extracted, with chloroform, a substance to which he assigned the formula $C_{19}H_{23}NO_6$.

*Merck's Bulletin*, October, 1888, describes, without method of manufacture, the alkaloid parthenicine of Ulrici, without reference to the original article. As this statement is two years older than

the researches of Ulrici published in Guyet's paper, it is presumed that the substance is a purified form of that to which was assigned the formula $C_{19}H_{23}NO_6$. It is described as follows: "Large rectangular prisms, with pyramids on four lateral sides. It is odorless, very bitter, quite readily soluble in water—still more so, however, in hot water—in alcohol, ether and chloroform. It gives colored identity-reactions with sulphuric acid and with potassium bichromate."

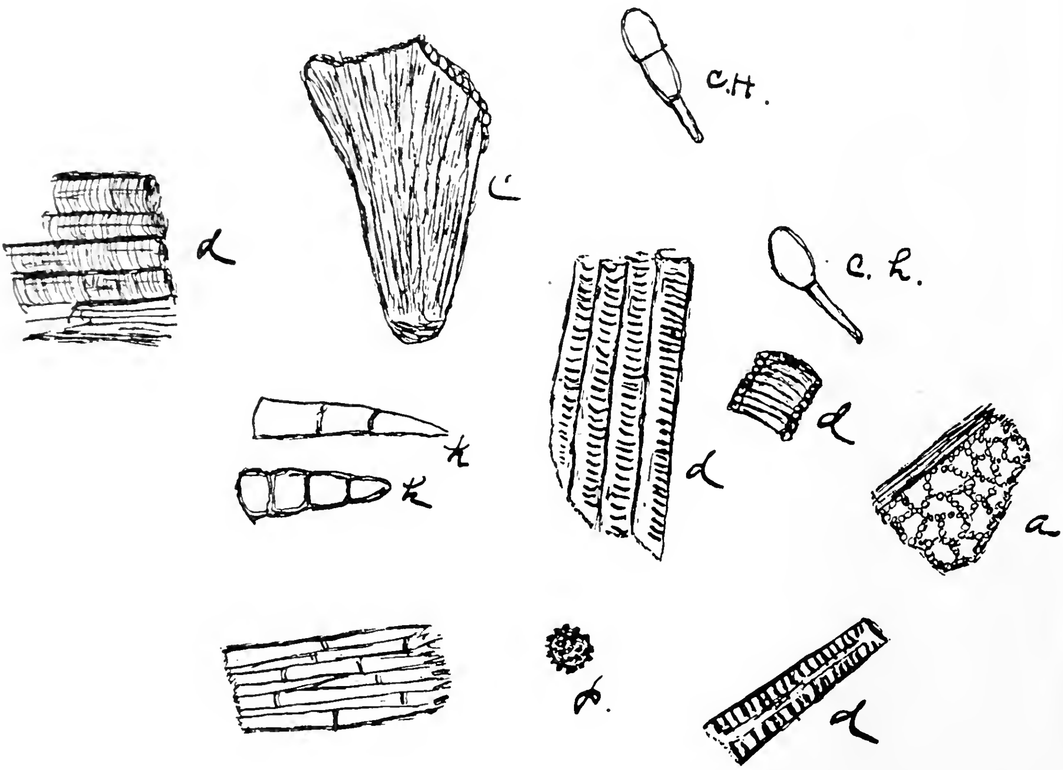


*Fig. 7.* Particles from powder, magnified about 200 diameters. *c. h.*, chaff hairs; *c*, fragment of chaff; *a*, fragment of anther wall; *p*, pollen grain; *d*, spiral ducts.

Such is the scanty knowledge of Tovar's parthenine and Ulrici's parthenicine. In neither case is that very important means of identity—the melting point—nor the color of stated reactions given.

So the means of identification of the active principle isolated by the writer with the so-called parthenine and parthenicine are almost missing.

On resuming the study of the plant, the first efforts were in estimating the loss of water in desiccation.

The following figures were obtained:

| Month of Collection. | Weight in Grammes. Fresh. | Weight in Grammes. Dried. | Percentage of Loss. |
|---|---|---|---|
| April | 134·66 | 30·3 | 77·49 |
| May | 737· | 150·5 | 79·5 |
| June | 552·8 | 127·6 | 76·91 |
| July | 885·9 | 177·2 | 79·99 |
| August | 680·4 | 106·3 | 84·37 |
| September | 538·65 | 155·9 | 71·50 |

In each case the sample was dried by hanging in a room accessible to draughts of air for six to eight weeks. While, of course, owing to the complex structure of the drug and the varying proportion of cellular and ligneous tissue, such data cannot be exact, it is, nevertheless, useful in establishing the fact that the amount of water in the fresh herb is somewhere between 70 and 80 per cent.

The average percentage of active principle was the next problem, and its extraction was performed by exhausting the drug with diluted alcohol; distilling off the alcohol; filtering the aqueous residue; washing the filter with water until the filtrate was tasteless, and extracting the aqueous liquid by agitation with chloroform. In this way a slightly impure yellow amorphous mass was obtained, and the yield was as follows:

| | | | Per Cent. |
|---|---|---|---|
| 25 grammes air-dried drug, collected in | April, | yielded | 0·31 |
| 100 " " " " " | May, | " | 0·84 |
| 100 " " " " " | June, | " | 1·03 |
| 100 " " " " " | July, | " | 1·13 |
| 75 " " " " " | August, | " | 0·66 |
| 100 " " " " " | September, | " | 0·53 |

It will be seen that the quantity of active principle in the plant gradually increases to the maximum in July, when it diminishes with the length of days until in October the plant is almost free from bitterness.

The process of extraction described above was not satisfactory, as the product was invariably contaminated with coloring matter; so other methods were tried. That used in the preparation of salicin—treatment of a decoction with lead oxide, removal of excess with sulphuric acid and neutralization of free acid with barium sulphide—did not prove satisfactory, as the lead oxide failed to remove all the coloring matter.

The process followed with best results was treating an infusion with lead acetate, filtering and agitating the filtrate with chloroform, distillation of the chloroformic extract, thereby recovering the solvent. The residue, by crystallization once or twice from alcohol, to which a small quantity of water had been added, was obtained pure in well-formed crystals—some 5 centimeters long—melting at 168°–169° C. The yield of pure substance from drug collected in June and July was about 1 per cent.

It proved soluble in 160 parts water, at 20° C.; 5 parts 95 per cent. alcohol; 2½ parts boiling alcohol; 110 parts ether, and in chloroform and acetic ether. It was soluble both in solution of soda and in ammonia water, the former solution turning red-brown on standing, the latter remaining colorless. It dissolved in concentrated sulphuric acid without change of color, but the solution became green on the addition of a crystal of potassium bichromate.

The aqueous solution was neutral to litmus paper.

That it is not an alkaloid was shown by the non-appearance of a precipitate on addition of Mayer's reagent to its aqueous solution, as well as by its solubility in solution of soda.

It failed to respond to tests for nitrogen, namely, heating with soda-lime and also heating with metallic potassium, and attempted conversion of the fused mass into Prussian blue by treatment with alkali, ferrous sulphate, ferric chloride and hydrochloric acid; while Schönn's test for sulphur gave negative results.

The substance has been analyzed and the empirical formula deduced therefrom, but this will not be stated until confirmed by an estimation of molecular weight and by analysis of derivatives.

The substance not being an alkaloid, the name parthenin can be safely bestowed upon it.

The rather superficial examination made by the writer in 1889 suggested the glucosidal character of parthenin. Careful investigation does not, however, confirm this surmise. As a glucoside, parthenin should, under the action of a diluted acid, be converted into glucose and some other body. This, as experiment showed, does not occur, although the reaction was attempted in two different ways. In the first method, several portions of parthenin were heated with diluted sulphuric acid for periods varying from boiling for one minute to heating on water-bath for four hours. The liquid in each case, after

its special method of heating, was agitated with successive portions of ether until the last ethereal portion possessed no bitter taste. The aqueous liquid after such extraction was carefully examined for glucose. Trommer's, Böttger's and the picric acid test were applied in each case with negative result.

The ethereal extract on evaporation yielded a brown syrupy mass. Crystallization from alcohol and acetic ether was attempted without success. By treatment with a small quantity of water, the substance solidified to an amorphous mass, which was still yellow from contamination with a resinous substance that reddened with solution of soda. This body melted at about 170° C. and is supposed to be the original substance. Other portions of the residue, after careful washing with ether, melted at 170°.

The second method was in boiling an alcoholic solution of parthenin with a small quantity of diluted sulphuric acid, addition of water, evaporation of the alcohol and extraction with ether. The aqueous residue gave no indication of glucose.

Since not a glucoside, parthenin was expected to possess reactions similar to some of the proximate principles. Its solubility in solution of soda suggested an analogy to santonin, and in that case a sodium compound, similar to sodium santoninate, might be produced.

To this end, parthenin was treated with a diluted solution of soda, carbon dioxide passed in until saturated and the solution evaporated to dryness, the passage of carbon dioxide being continued to the end of the heating. The perfectly dry residue was treated with absolute alcohol, when the filtered alcoholic extract yielded on spontaneous evaporation a yellow syrup, which, on addition of a small quantity of water, solidified to a brownish yellow mass, which gave the sodium flame and charred on heating, melting irregularly but not completely, until at red heat. This was sparingly soluble in water, and the aqueous solution, which was neutral, yielded a precipitate with silver nitrate.

An effort to obtain the product after the method used in the manufacture of sodium santoninate, dissolving in solution of soda and crystallizing the resulting product by concentration of the solution, has not yet met with success.

This somewhat superficial effort seems to indicate rather clearly the formation of a sodium compound of parthenin, which can be converted into a silver salt. The investigation of this sodium compound is still continued.

The fact being clearly established that parthenin is not a glucoside, but rather a proximate principle somewhat akin to santonin, suggests a more practical method of preparation than by extraction with chloroform. A process in which the lead acetate dissolved in the cleared decoction was dissociated by addition of sulphuric acid, which would precipitate the lead as sulphate, was not attempted lest the acetic acid set free would react with the parthenin. This fear is groundless, and a practical process of extraction on these lines will be devised.

On distillation of the drug with steam there passed over a minute quantity of volatile oil possessing the distinctive odor of the plant, and from which, on standing, there separated a stearopten possessing camphoraceous taste. As yet the quantities won have been too small for investigation, but attention will be turned to it during the coming summer.

In conclusion, a few words as to the medical properties of parthenin. Tovar reported it as a remedy in facial neuralgia, and it also proved beneficial in a case of fever and anæmia where quinine failed. Guyet confirmed its efficiency in neuralgia, especially the cranial variety; but he found it utterly without effect as antipyretic. In Jamaica the plant is used as a remedy for ulcerated sores and certain skin diseases, especially such as are of a herpetic or pustular character. The dose of Ulrici's parthenicine is stated as 0·05 gramme every hour in neuralgia, while gramme doses are used in intermittent fever.

The subject is worthy of further consideration on the part of therapeutists, and to this end the writer proposes preparing during the summer considerable parthenin, which will be furnished in limited quantities to those physicians who will agree to conscientiously test its merits and publish the results, whatever they may be.

The writer's thanks are due Miss S. E. Bres for the artistic sketch of the flowering branch.

New Orleans, March 8, 1897.

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Formaldehyde is detected by dissolving 0·1 gramme of morphine hydrochloride in 1 c.c. of concentrated sulphuric acid, and adding an equal volume of the solution to be tested, without mixing; in the presence of formaldehyde [illegible] ous solution will become a clear red-violet color in a few minutes.

# THE SHADDOCK OR GRAPE FRUIT.

By J. H. Hart,
Superintendent of Botanical Department, Trinidad.

The March, 1896, number of the American Journal of Pharmacy is especially interesting to me, and as I am a twenty-one-years resident (constantly employed in botanical matters in the West Indies), I venture to make a few remarks on it. As a rule we look at pictures before the reading matter, and I did so in the case of the shaddock paper. Now, as I know the plant, the illustration No. 1 is certainly not a shaddock, but a grape fruit, or forbidden fruit, and as I find, page 123, paragraph 4, that the terms grape fruit and shaddock are interchangeable, this may explain.

It is quite true that "*no reliance can be placed upon the common names of plants or flowers, etc., etc.*," and this sentence contains the gist of the whole controversy as to names.

I know Jamaica well, having resided there eleven years, and know the districts of Macfadyen well, and the fruits in them.

The home (English) botanist, however, makes the citron, lemon and lime one species. Macfadyen made them three; and various other changes, etc. The true fact is, no two men can see alike. If asked to classify the citrus tribe, I should make *Citrus medica* include all the lemons and limes and their hybrids, which are legion.

I should let *Citrus aurantium* represent the orange of the St. Michael's type (sweet orange), with all its varieties, and I would let *Citrus decumana* cover all the shaddocks, grape fruit, or pumelows, etc., and their varieties, which are also very numerous. *Citrus nobilis*, or the tangerine and mandarin (also interchangeable names), appear to maintain themselves fairly distinct. These oranges are sometimes called "Portugal oranges" in Trinidad. We have one, however, imported from Grenada, W. I., that approaches the grape fruit in size; at the same time, I recognize intermediate varieties between many of those mentioned.

We have a sweet lime, a fruit with an orange skin, with a lime flesh, but with a distinct mixture of orange and lime in flavor. We have a lime, larger than a lemon, with none of the characters of a lemon. There is a sweet orange called the bergamot in Jamaica, which is very clear and distinct from that I recently received from Italy as bergamot; and unless we agree to adopt *special Horticul-*

*tural names*, I do not really see how the botanists can help out of the muddle, for muddle indeed is the classification of citrus. I had lately one of the finest shaddocks sent me I ever saw; it was delicious in flavor and of a bright red. I have grafted plants on lemon and orange stocks, and have two fine unions growing freely.

In Jamaica, shaddock is shaddock and nothing else; although an old "nigger," to please a questioner, if asked: Is that shaddock? pointing to a grape fruit, would say: yes, massa! Shaddock, sa'! or *vice versa*. Shaddock, however, in the market, is shaddock, or the largest fruit of the citrus tribe. Grape fruit, or forbidden fruit, presents as many characters as other varieties of citrus. Red flesh, white flesh; sour, bitter, sweet; but the one called grape fruit hangs in clusters like grapes (6 to 10 together), hence the name; and there is evidence that the larger kind comes from the smaller.—"The Shaddock from the Grape Fruit" (see Bulletin No. 9 of this department, p. 19).

I must take exception to the statement, p. 126, "which are extremely acid." The author should have stated that Jamaica oranges were extremely acid. Trinidad oranges and Grenada oranges are extremely sweet; but while you can get good oranges in Jamaica, there are truly many sour ones there. In both Jamaica and Trinidad, the wisdom of planting seedlings is being almost universally doubted, and my article 225, Bulletin, was especially directed to this point.

TRINIDAD, January 26, 1897.

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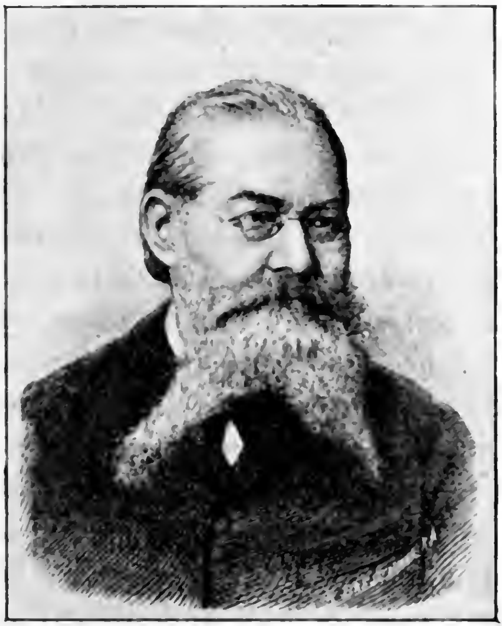
## HERMANN HAGER.

BY FRED. HOFFMANN.

On the gloomy afternoon of the 29th of January, 1897, a small company, consisting of a few relatives, of some townspeople, including several local pharmacists, and of the representatives of two pharmaceutical papers, followed a plain hearse to the graveyard of the town of Neu Ruppin, located a few miles northwest of the German capital. Such was the funeral of the Nestor of German pharmacy of our generation, *Dr. Hermann Hager*. Flowers and palms sent as a last tribute of gratitude and respect by his publishers, and by the editors of the *Pharmaceutische Zeitung*, and of the *Pharmaceutische Wochenschrift*, in Berlin, covered the coffin and the grave,

and a wreath of flowers had been sent by the President of the German Apothecaries' Association. Although less than two hours by rail from the German capital, not one representative pharmacist, no delegate from any of the national or metropolitan pharmaceutical societies, nor from the journal founded by Dr. Hager in 1859, and graced by his famous name ever since, attended his funeral.

What a representative gathering would the funeral of such a man of national, nay, of world-wide reputation, have drawn together anywhere in the United States! The foremost representative men of American pharmacy hastened to Philadelphia to pay a last respect to *Procter* at his funeral in February, 1874, and to *Maisch* in September, 1893.



No such tender sense of gratitude and veneration seems to pulsate in the hearts and among the ranks of the representative men and members of pharmaceutical associations on this side of the Atlantic. A profession as well as a country honor themselves by honoring the life work and the memory of their great men during their lifetime as well as at their demise, even if the saying should apply: "a man lives by his excellencies and not by his faults." It is the more gratifying that the Continental pharmaceutical press has promptly and nobly offset this apparent show of a want of veneration for the departed master of German pharmacy by unanimous and warm-hearted obituaries.

*Hans Hermann Julius Hager* was born in Berlin on January 3, 1816, where his father was an army surgeon. After having passed the elementary schools, he attended the high schools at Torgan and Brandenburg, and in April, 1832, entered upon an apprenticeship in the pharmacy of the town of Salzwedel. Then apprenticeship in German pharmacies included the performance of all the common handiwork, of keeping the store, the laboratory and the storage rooms in proper order, of cleansing and dusting counters, shelves, containers, utensils, oil-lamps, etc., of delivering medicines to customers, etc. Young Hager was by no means spared this hard ordeal. Little leisure time was left for study, and but very few pharmaceutical books were placed at his disposal, while his means were insufficient to purchase any. But bent upon study, and of an inquisitive mind, young Hager made good use of the few text-books of pharmacy accessible to him, among them, "Hagen's Treatise on the Art of Pharmacy," as well as of his old school-books. During the four years of apprenticeship he perfected his knowledge of Latin so much that he retained for life the ability to write fluently in Latin. He also closely applied himself to the study of French, of history and of natural philosophy. Incidentally he obtained a small treatise on chemical stoichiometry, which induced him during the last year of apprenticeship to elaborate a text-book of stoichiometry for pharmacists, which, however, never has been published.

At the close of his apprenticeship Hager passed the obligatory examination with much credit, and subsequently served as assistant for some years in pharmacies in several towns. During these years he read all books accessible to him, and applied himself with much interest and assiduity to becoming familiar with the flora of the diluvial plains of Northern Germany. He then served for one year as army pharmacist in the garrison hospital in the capital of Silesia, Breslau, whither his father had been removed as army surgeon. Here young Hager found time and opportunity to attend lectures at the University on natural philosophy, chemistry and botany. After having passed his one year of army service, he had the good fortune to obtain a place as assistant with an apothecary in the town of Perleberg, who was an accomplished pharmacist, a sympathetic man and the possessor of a good pharmaceutical library. Of this Hager made good use, so much so that in 1841 he ventured to apply to the highest examination board in medicine and pharmacy

in Prussia for permission to pass his State examination as apothecary without the customary preceding attendance of at least one year of university lectures. He was admitted and passed this ordeal with credit.

Hager subsequently served two more years as assistant, always applying his leisure time to study in almost every branch of natural science. He also succeeded in obtaining the degree of Doctor of Philosophy at the University of Jena, and, in 1843, he managed to purchase a pharmacy in the town of Fraustadt in the Prussian province of Posen. Here he attended to his comparatively small business most of the time with but one apprentice, married, raised a family and passed seventeen of the most studious and well-applied, and, perhaps, also happiest years of his life.

Besides a good prescription business, Dr. Hager attended, with his apprentices, to the preparation of all galenicals and most pharmaceutical chemicals, including all metallic salts and solutions, even to the preparation of the few alkaloids then in use. With his sense of practical application and great skill he attained to perfect mastership in the art and practice of pharmacy in every direction, as also in the performance of analytical and microscopical work and examinations, and accumulated a vast amount of knowledge and experience in all branches of the theory and practice of pharmacy and of related application.

While, during the years of assistanceship, Dr. Hager had occasionally contributed miscellaneous writings and some poetical efforts to local papers, he seems to have abstained from any contribution from the wealth of his knowledge and experience to pharmaceutical periodicals during the years of his activity as apothecary in Fraustadt. But there he soon entered upon his successful career as a writer and author. His first publications of repute seem to have been an essay on "Weather and Its Considerations," in 1845; his "Handbook of the Art of Dispensing," "Cosmos Diluvialis," or the deluge, an historical study; "Treatise on the Manufacture of Mineral Waters;" "Commentary on the Pharmacopœias of Northern Germany" (1854); "Manuale Pharmaceuticum;" "Adjumenta Varia;" "Pharmacopœia Homœopatica."

The success of several of these works, and the want of incitement as well as of literary and scientific resources in the small town, induced Dr. Hager the more to dispose of his pharmacy, as he, in

1859, had commenced the publication of a strictly scientific periodical, the *Pharmaceutische Centralhalle.* Early in 1860 he removed to Berlin, with a view to applying his entire time and labors to scientific and literary work. Henceforth his little private laboratory became the prolific starting point for the solution of many a scientific or technical problem in the practice of pharmacy, and of a vast amount of analytical and microscopical work. In 1864 Dr. Hager established, with his friend, Dr. E. Jacobsen, of Berlin, the *Industrie Blatter*, in which he inaugurated a fearless exposure of the nostrum fraud. Of these specialties he analyzed in the course of years more than any contemporary. He provided his two journals largely with material from his own pen and laboratory work.

In Berlin Dr. Hager contracted the friendship of the brothers, Ferdinand and Fritz Springer, of the eminent publishing firm of Julius Springer, who henceforth became his publishers and life-long friends. Here he elaborated and published "First Lessons in the Practice of Pharmacy," "First Lessons in Pharmaceutical Botany," "The Microscope," "Commentary on the Prussian Pharmacopœia," "Latin-German Vocabulary to the Pharmacopœia," and revised some of his former books for republication in new editions. In Berlin he also commenced the elaboration of his greatest and most enduring work, the "Handbook of the Practice of Pharmacy."

Dr. Hager's increasing reputation drew more and more callers to his quiet home and study in the German capital. Being of a retiring disposition, and carefully estimating the value of time, he gradually longed for a refuge where he could attend to and accomplish his life work in less disturbed solitude. He acquired a modest farmer's home, located in a rather isolated and unattractive place, called Pulvermühle, near the village of Fürstenberg, a few miles distant from the old university city of Frankfort, on the Oder River. He removed thither in October, 1871. Here Dr. Hager enjoyed, for ten years in full retirement, a studious and active life, applying all his time and interests to research and literary work. During these busy years he continued his analytical work, edited his two journals, one in Berlin, the other in Dresden, translated the first Pharmacopœia of the newly consolidated German Empire, and in 1872 and 1873 wrote a comprehensive commentary on this work.

In 1876 he completed and published his "Handbook of the Practice of Pharmacy," in two large volumes, to which he added a third

volume in 1880. This master work fully represented the accumulated knowledge of the past, largely enriched by his own vast stock of theoretical knowledge and practical experience in all branches of pharmacy, and of analytical and microscopical application, and of the examination and estimation of drugs, chemicals and of foods. It at once superseded all similar older works and became the standard text and guide book, as well as an almost never-failing reference work for pharmacists and druggists far beyond the limits of the Fatherland. It made the name of Hager a household word in pharmacy and the drug trade all over the world, and, at least abroad, is still a widely used pharmaceutical reference book.

During the remaining years of his residence in Pulvermühle, Dr. Hager accomplished a great deal of analytical work for revision and verification, elaborated a study on oil of turpentine and its detection as an adulterant of essential oils, and revised a number of his works for republication in new editions. In 1881 Dr. Hager removed, after the death of his only friend in his lonely retirement, a physician, to Frankfort-on-the-Oder, where he lived in strict retirement until 1896. Here he continued his customary laboratory and literary work, completed several revisions of his larger books and furnished various periodicals with occasional contributions. From the editorship of the *Centralhalle* and the *Industrie Blätter* he had retired in 1879, allowing his name to be retained on the title-pages.

Until 1890 Dr. Hager enjoyed excellent health and the full powers of his inquisitive and prolific mind and activity, always occupying himself with literary work or study, and in later years collecting minerals and conchyts; but in this year he became a victim to influenza, and since then his health failed in consequence of occasional relapses of this malady. In anticipation of the approach of the end of his struggles, the octogenarian resorted, with the most sympathetic and affectionate companion of his life, his wife, in July, 1896, to the home of one of their sons, living in the town of Neu Ruppin, near Berlin. Here he spent the last few months of his earthly life in peaceful meditation, kindly remembered by a few noble friends. In December, Dr. Hager suffered a severe relapse of influenza from which he did not recover. On the 24th of January he quietly fell asleep to eternal rest, from an active and most useful life, replete with superior work and generous efforts for his fellow-men, but devoid of public recognition and honors at home. His devoted

wife, who also suffered from influenza, on being informed, on the day of her husband's funeral, of his death, closed her eyes forever on the very same day.

More than any other of his German contemporaries, *Dr. Hager* was, in the American sense, a self-made man. The stamp of the autodidact remained impressed upon his character, his labors and his writings and imparted to them the charm and the force of originality. He was a man of rare talents, with a keen and discriminating intellect and an excellent memory. The style of his writings was lucid and attractive; he also was a clever draughtsman, drawing with his own pen nearly all the sketches for the abundant illustrations of his works. Intense work was to him always a labor of love. Like most men of originality and genius, Dr. Hager was also bent upon critical reflection and upon an unreserved candid expression of his opinion. However stern and straightforward his intellectual powers and the courage of his honest conviction made him, his mind was as gentle and forbearing as that of a child. In his long and active career, by no means free from cares and disappointments, and in a profession replete with antagonistic and uncharitable elements, Dr. Hager has not been spared the cruel stings and even the calumnies of adversaries, particularly of those more fortunate in inheritance and patronage, and more successful in public position and honors, which favors he never sought by submission or flattery. Although a recognized master of his profession, a prolific and excellent writer, and expert in pharmacopœial work and a man of worldwide fame, Dr. Hager has never been called upon to participate in the elaboration or the revision of a pharmacopœia; nor has he ever received, from the Government or the State authorities, any public recognition or distinction for his eminent merits for the advancement and the reputation of German pharmacy; whereas the profession of many countries has paid its respects to the great master by enrolling his famous name in the lists of honorary membership in their national associations—first among them the American Pharmaceutical Association and several colleges of pharmacy in the United States.

As long as pharmacy remains a distinct profession and retains its glorious history, the names of *Hermann Hager* and *F. A. Flückiger*[1]

[1]Amer. Jour. of Phar. (1895), Vol. 67, p. 65.

will stand foremost among the few bright stars in the galaxy of pharmaceutical master minds during the second half of the nineteenth century. Hager has set himself the most enduring monument by his life work and writings, and should the present or the succeeding generation of pharmacists erect some worthy memorial to the most deserving pharmaceutical author and mentor of his time, these words might well be inscribed with particular application and truth:

> "Das Edle in der Menschenwelt,
> Es lebt im menschlichen Gemüthe.
> Es ist nicht Macht, nicht Gut und Geld,
> Es ist ein Herz voll Lieb' und Güte,
> Es ist ein Sinn voll Thatenkraft,
> Der zielbewusst das Höchste schafft."

LEIPZIG, March, 1897.

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## A BRIEF RÉSUMÉ OF ACETIC ANHYDRIDE IN OIL ANALYSIS, AND A MODIFICATION OF THE METHOD FOR ESTIMATING MENTHOL IN OIL OF PEPPERMINT.

BY LYMAN F. KEBLER.

It is well known that the official requirements for some of the essential oils are not rigid enough, on the one hand, to detect all forms of adulterations or manipulated products, while, on the other hand, some of the qualitative tests are so exacting as frequently to discriminate very unfavorably against genuine oils produced in large quantities in the United States. Just where to draw the line at present is, in many cases, a difficult problem—a problem which will probably never be solved in some cases, for the ingenious adulterator always aims to debase his goods in such a manner as to make the fraud difficult of detection.

The chemical investigations of essential oils, during recent years, are contributing much toward laying the foundation on which to base analytical methods. In some cases simple and efficient processes for estimating certain valuable constituents have already been formulated. Methods that are no more difficult of application than those commonly employed for determining the quality of fixed oils. In fact, some methods are common to both, as the one in which acetic anhydride is used.

The value of acetic anhydride as a chemical reagent has long been known to organic chemists. But it was left for the genius of the late Dr. R. Benedikt[1] to formulate a qualitative method embodying the well-known property of acetic anhydride.

The method is based on the principle that alcohols and hydroxy acids on being heated with acetic anhydride, have the hydrogen atom of the hydroxyl group replaced by the acetyl group, thus forming compound ethers.

The process, according to Benedikt and to Benedikt[2] and Ulzer, is briefly as follows: from 20 to 50 grammes of the fatty acids are boiled with an equal weight of the acetic anhydride for two hours in a flask provided with an inverted condenser. The mixture is then transferred to a suitable vessel, about 600 c.c. of hot water added and boiled for half an hour. The mixture is then allowed to separate into two layers, the aqueous portion withdrawn and the oily layer treated thrice more in the same manner. The acetylized products are then filtered in a drying oven to eliminate all moisture. From 3 to 5 grammes are carefully weighed off and dissolved in pure alcohol. In this alcoholic solution the acid and the ether values are determined as usual. The former is called the *acetyl acid value*, the latter the *acetyl value* and the sum of both is termed the *acetyl saponification value.*

The theory of the process can readily be seen from the following equations:

$$\underset{\text{Cetyl Alcohol.}}{C_{16}H_{33}OH} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Cetyl Acetate.}}{C_{16}H_{33}O.C_2H_3O} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}.$$

$$\underset{\text{Cetyl Acetate.}}{C_{16}H_{33}O.C_2H_3O} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Cetyl Alcohol.}}{C_{16}H_{33}OH} + \underset{\text{Potassium Acetate.}}{KC_2H_3O_2}$$

$$\underset{\text{Ricinoleic Acid.}}{C_{17}H_{32}(OH)CO_2H} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Acetyl Ricinoleic Acid.}}{C_{17}H_{32}O.C_2H_3O.CO_2H} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}$$

$$\underset{\text{Acetyl Ricinoleic Acid.}}{C_{17}H_{32}O.C_2H_3O.CO_2H} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Acetyl Ricinoleate of Potassium.}}{C_{17}H_{32}O.C_2H_3O.CO_2K} + H_2O$$

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[1] 1887, *Ztschr. f. d. Chem. Ind.*, 1, 149, communicated Feb. 26, 1886.

[2] 1887, *Monatshefte für Chemie*, 8, 47; 1892, Die Analyse der Fette und Wachsarten, zweite Auf, p. 113; 1895, Chemical Analysis of Oils, Fats, Waxes, etc., by Benedikt and Lewkowitsch, p. 127.

$$\underset{\text{Acetyl Ricinoleate of Potassium.}}{C_{17}H_{32}O.C_2H_3O.CO_2K} + \underset{\text{Potassium Hydroxide.}}{KOH} = \underset{\text{Potassium Ricinoleate.}}{C_{17}H_{32}(OH)CO_2K} + \underset{\text{Potassium Acetate.}}{KC_2H_3O_2}$$

J. Lewkowitsch[1] has studied the above process very thoroughly, and is continuing his work at present.

In 1894 F. B. Power[2] and C. Kleber proposed an analogous method for estimating menthol in oil of peppermint. The method is briefly as follows: About 20 grammes of the oil are mixed with 30 c.c. of normal alcoholic sodium hydroxide, in a flask provided with a reflux condenser and heated to boiling for one hour. The uncombined alkali is estimated by means of normal sulphuric acid, using phenolphthalein as indicator. Each cubic centimeter of the standard alkaline solution consumed represents 0·156 gramme of menthol in the form of ethers.

The contents of the above flask are repeatedly washed with water, to remove the alcohol present and the oily portion boiled one hour with an equal volume of acetic anhydride and 2 grammes of fused sodium acetate in a flask provided with an inverted condenser, the end of the condenser tube being so ground as to fit accurately into the neck of the flask. On cooling, the contents of the flask are washed with ample water, then with a dilute alkaline solution, the alkalinity removed by washing with water again, and the oily portion ultimately dried with calcium chloride and filtered. From 8 to 10 grammes of the acetylized oil are treated as above for estimating the combined menthol.

From the data obtained by the above procedure the total per cent. of menthol, free and in the form of ethers, may be calculated by the following formula:

$$P = \frac{a \times 15{\cdot}6}{S - (a - 0{\cdot}042)}$$

$P$ equals total menthol; $S$ equals grammes of acetylated oil used; $a$ equals the number of cubic centimeters of normal sodium hydroxide required for saponification; and 0·042 is a constant obtained by

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[1] 1890, *Proc. Chem. Society*, 72 and 91; *J. Soc. Chem. Ind.*, 9, 660.
1890, *J. Soc. Chem. Ind.*, 9, 846; Chemical Analysis of Oils, Fats, Waxes, etc., 1895, by Benedikt and Lewkowitsch, p. 129.

[2] 1894, *Pharm. Rundschau*, 12, 157; *Circular of Information*, No. 3, by Fritzsche Brothers, p. 12.

subtracting the normal factor of menthol (0·156) from the normal factor of menthyl acetate (0·198).

The two following equations form the basis of the process:

$$\underset{\text{Menthol.}}{C_{10}H_{19}OH} + \underset{\text{Acetic Anhydride.}}{(C_2H_3O)_2O} = \underset{\text{Menthyl Acetate.}}{C_{10}H_{19}O.C_2H_3O} + \underset{\text{Acetic Acid.}}{HC_2H_3O_2}$$

$$\underset{\text{Menthyl Acetate.}}{C_{10}H_{19}O.C_2H_3O} + \underset{\substack{\text{Potassium}\\\text{Hydroxide.}}}{KOH} = \underset{\text{Menthol.}}{C_{10}H_{19}OH} + \underset{\substack{\text{Potassium}\\\text{Acetate.}}}{KC_2H_3O_2}$$

Being frequently requested to estimate the amount of menthol in peppermint oils on short notice, the writer has modified the above procedure so that the per cent. of this constituent can readily be estimated in three hours, while the original method requires the greater part of a day for execution.

FOR ESTIMATING THE COMBINED MENTHOL.—Place from 10 to 12 grammes (accurately weighed) of the oil into a suitable flask, add about 12 c.c. of normal alcoholic sodium hydroxide, connect the flask with an inverted condenser and boil for one hour. Retitrate the excess of alkali by means of standard sulphuric acid, using phenolphthalein as indicator. Each cubic centimeter of standardized alkali consumed corresponds to 0·156 gramme of menthol as esters. This part of the process embodies the well-known principle of Koettstorfer.

TO ESTIMATE THE TOTAL MENTHOL.—Place from 12 to 15 grammes (accurately weighed) of the oil into a suitable flask (the writer uses an ordinary Kjeldahl digesting flask), add an equal weight of acetic anhydride, 2 grammes of anhydrous sodium acetate, attach to a reflux condenser and boil the contents of the flask one hour. Allow the mixture to cool somewhat, transfer to a 250 c.c. separatory funnel, with successive portions of distilled water, using about 150 c.c. Agitate the funnel and contents well, set aside a few minutes, so that the mixture will separate into two layers. Withdraw the aqueous layer and wash again with 150 c.c. of water as above. Having removed the second wash water, add 50 c.c. of water, a few drops of phenolphthalein solution, and just enough of a 5 per cent. aqueous sodium hydroxide solution to render the contents of the funnel pinkish, after thoroughly agitating; then add enough water so that the aqueous portion will amount to about 150 c.c.; agitate well, allow the mixture to separate and withdraw the alkaline aqueous solution. Wash the oily layer again with 150 c.c. of water as above. Remove the water as completely as possible and transfer the acety-

lized oil to a suitable flask, using a small amount of alcohol to transfer the last portions. To the oil in the flask add from 50 to 60 c.c. of normal alcoholic sodium hydroxide, connect the flask to an inverted condenser and boil for one hour. Retitrate the excess of the alkaline solution by means of normal sulphuric acid. Each cubic centimeter of normal alkali combined corresponds to 0·156 gramme of menthol.

On deducting the amount of menthol contained in the oil in the form of esters from the total menthol found, we have the amount of free menthol.

The table on next page contains the results obtained by the above process for commercial menthol and a number of samples of oil of peppermint in connection with the specific gravities, boiling points and residues. The boiling points were determined with metallic bath.

It requires only a casual review of the contents of the table to show that oil of peppermint is a most variable product. Then when we call to mind that normal Japanese oil generally contains about 75 per cent. of menthol, the variation is still greater. But it must also be remembered that an oil containing a high percentage of menthol frequently does not possess the desired fine aroma so valuable in essential oils. The quality of the aroma is generally indicated by the amount of menthol esters. Yet, there may be some disturbing elements present, such as the sulphur compound, recently discovered,[1] which will vitiate an otherwise fine aroma very materially.

The writer has every reason to think that the oils examined above are genuine, excepting, of course, the sample marked "Unknown." This was highly adulterated with turpentine, as the boiling points clearly show.

In examining oil of peppermint it is necessary to determine: (1) the specific gravity, although this is only an indication; (2) the boiling point, varying from a few degrees below 200° C. to about 230° C. (uncorrected), with some residue; (3) the amount of menthol. The combined menthol varies from 3 to 16 per cent. The total menthol may vary from 30 to 80 per cent. These data, in connection with the aroma and identity tests, will undoubtedly show the character of any oil of peppermint.

[1] 1896, C. Kleber, *Pharm. Review*, 14, 269; Schimmel & Co.'s *Semi-annual Report*, October, p. 48.

| Source. | Specific Gravity at 15° C. | Per Cent. of Menthol as Esters. | Per Cent. of Free Menthol. | Per Cent. of Total Menthol. | Number of c c. Distilled from 50 c.c. of Oil between | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | * ?–200 | 200–205 | 205–210 | 210–215 | 215–220 | 220–225 | 225–230 | 230–235 | 235–240 | 240–250 | 250–260 | Residue. |
| | | | | | † ?–204·8 | 204·8–209·9 | 209·9–214· | 214 –219·1 | 219·1–224·2 | 224·2–229·3 | 229·3–234·4 | 234·4–239·44 | 239·44–244·56 | 244·56–254·7 | 234·7–264·85 | — — |
| Commercial Menthol, | — | None | 99·66 | 99·66 | M. P. 43 | B. P. 212 | — | — | — | — | — | — | — | — | — | — |
| Western . . . . . . . | 0·9112 | 3·72 | 29·02 | 32·48 | 2 | 3 | 4 | 5 | 7 | 3 | 5 | 4 | 2 | 3 | 6 | 6 |
| Michigan . . . . . . | 0·9065 | 3·06 | 28·25 | 31·33 | 2 | 3 | 6 | 9 | 11 | 7 | 4 | 3 | — | — | — | 5 |
| Michigan . . . . . . | 0·9147 | 4·51 | 29 92 | 34·43 | 2 | 4 | 5 | 6 | 7 | 4 | 3 | 3 | 3 | 2 | 4 | 7 |
| New York . . . . . . | 0·9·43 | 8·07 | 44·83 | 52·90 | 6 | 9 | 10 | 9 | 7 | 4 | 1 | 1 | — | — | — | 3 |
| New York . . . . . . | 0·9099 | 7·31 | 45·43 | 52·74 | 11 | 6 | 17 | 11 | 2 | 1 | — | — | — | — | — | 2 |
| Michigan . . . . . . | 0·9099 | 10·00 | 40·87 | 50 87 | 5 | 8 | 15 | 10 | 8 | 2 | — | — | — | — | — | 2 |
| Unknown . . . . . | 0·8937 | 8·30 | 14·94 | 23·24 | 30 | 1 | 2 | 3 | 2 | 1 | 1 | 1 | 1 | — | — | 8 |
| Michigan . . . . . . | 0·9279 | 16·06 | 31·55 | 47·61 | 6 | 7 | 7 | 7 | 5 | 4 | 8 | — | — | — | — | 6 |
| Mixture of Michigan and New York . . . | 0·9079 | 4·68 | 38 30 | 42 98 | 4·5 | 4·5 | 9 | 11·5 | 10 | 4·5 | 2 | — | — | — | — | 4 |

* Degrees centigrade, uncorrected.

† Degrees centigrade, corrected.

It is hoped that the Pharmacopœial Committee will find it desirable to introduce the boiling point of this oil, at least, into the next revision of the Pharmacopœia, if they do not see their way clear to admit a method for determining the per cent. of menthol. But the writer cannot see any reason why a simple method like the above should not be made serviceable, seeing that good acetic anhydride can be so reasonably secured.

305 Cherry Street, Philadelphia, Pa.

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## SOME OBSERVATIONS ON ACACIA OF COMMERCE.

By J. Henry Schroeder, Ph.G.

Of all the drugs sent forth into the commerce of the world, there is, perhaps, no single one of which there exist so many varieties as of acacia. A difference in the source of production is one cause for the variableness in quality of the commercial article. In some cases the quality of the gum is lowered by the season of collection, and a secondary grade is obtained by assorting the other varieties.

The chemical literature relating to the exact nature of the gums of different species of acacia is only limited, and they have, so far, been subjected to little thorough study.

As their habitats vary greatly, they are usually known by the names of the localities where they are collected, or by the names of the ports from which they are shipped.

For pharmaceutical uses the U. S. Pharmacopœia directs that the gum of Acacia Senegal be employed.

It was with a view of determining the presence of dextrin in the powdered commercial "gum arabic," that an examination of different samples was undertaken.

It has been alleged that the high price of a good quality of gum has tempted those who handle the product, and that many of them have resorted to adulteration for pecuniary gain, dextrin being the substance usually employed for the purpose. While for merely technical purposes an addition of dextrin might not be a disadvantage, such adulterated gum is, of course, unfit for pharmaceutical purposes, especially for the preparation of emulsions.

Observations were made during the work, which I think of sufficient interest to the pharmacist to report.

Before submitting in detail the results of the examination, I desire

to state that they are presented solely on account of the interest which they seem to possess for the practical pharmacist, with the consciousness that, considered as a scientific investigation, the important factor, completeness, is lacking.

According to the U. S. Pharmacopœia, acacia is "a gummy exudation from *Acacia Senegal*, Willdenow (nat. ord. *Leguminosæ*). Besides the description of the physical appearance of the gum, the following tests are also given:

(*a*) Acacia should be soluble in 2 parts of water; it should yield a gelatinous precipitate with basic lead acetate, T. S., ferric chloride, T. S., or concentrated solution of sodium borate, and does not reduce alkaline cupric tartrate, V. S.

(*b*) The powder is not colored blue (absence of *starch*), or red (absence of *dextrin*), by iodine, T. S.

In addition to these tests, it may be of interest to refer to two others for the presence of dextrin.

One, which is from Hager, Hartwich and Fischer's *Commentar zur Pharm.*, B. II, p. 44, is as follows:

"Three c.c. of a solution composed of 15 drops of solution of ferric chloride, 15 drops of saturated solution of potassium ferricyanide, 5 drops of diluted hydrochloric acid (sp. gr. 1·165) and 60 c.c. of distilled water, are added to 6 c.c. of a solution of the suspected gum (strength of solution should be 20 per cent). If the gum be devoid of dextrin, it will be colored a pure yellowish-brown tinge, this color remaining permanent during eight to ten hours. If dextrin be present, the color will change in about one hour to blue."

The other test, which is evidently a modification of the above method, is described in *El Memorandum*.[1]

It seems to be erroneous, inasmuch as it contains potassium *ferro*cyanide instead of potassium *ferri*cyanide, in presence of ferric chloride. The sulphuric acid present in the solution does not prevent the precipitation of ferric ferrocyanide. This test seems, therefore, inapplicable.

The foregoing are the tests upon which the examination of samples of commercial gum arabic was based.

While I was examining samples of the powdered gum in regard to their action upon alkaline cupric tartrate, V. S., I noticed that,

[1] *Pharm. Jour.*, October 12, 1895, p. 322, and *Proc. Am. Pharm. Assoc.*, Vol 44, p. 625.

in every instance, a marked reduction was taking place. A repetition of the experiments verified this observation. I decided to apply the test to a sample of the whole gum. For this purpose the best gum (answering the Pharmacopœial description in physical appearance) obtainable was employed. One gramme was pulverized in a clean mortar, and dissolved in 10 c.c. of recently distilled water.

Just sufficient potassium hydrate solution was added to give an alkaline reaction, and this solution heated with alkaline cupric tartrate, V. S., in a water-bath (boiling temperature), during twenty minutes. Here, too, a well-defined reduction was observed, though seemingly less prominent than that produced by an equal amount of the *powdered* substance. When the test solution was heated, without the solution of gum, for an equal length of time, it remained clear. A like behavior of acacia is described in Hager, Hartwich and Fischer's *Commentar*, as follows: "Acacia does not reduce Fehling's solution at 60°–70°, but has a reducing action after being boiled with the reagent," and "dried gum in solution reduces Fehling's solution at temperature of water bath." I have observed, however, that gum, not otherwise than air-dried, reduces Fehling's solution without being boiled, upon heating a solution for some time at water bath temperature.

The increased reduction by the powdered gum is probably due to drying previous to powdering it.

The iodine test for dextrin and starch was applied to each sample in powder and in the form of solution. When applied to the same powder it imparts to the powder only a light yellowish color of the iodine. If only traces of dextrin are present a dark red tint is produced. When a larger quantity of dextrin is present, the color produced by a few drops of the reagent is almost black. If starch and dextrin be present in the same sample, they can hardly be distinguished. One minim of the official T. S. of iodine will produce a decisive tint in solution of dextrin in distilled water, in proportion of 1 of the former to 2,000 of the latter. The presence of gum does not interfere with this reaction.

As commercial dextrin is not a product of definite composition and constant proportions, the delicacy of the iodine test may, of course, vary accordingly.

As all the samples of gum gave negative results with iodine,

traces of dextrin and starch were added to the sample under examination; the reagent in all cases gave prompt indication of their presence, showing that there was present in the original sample nothing to mask the reaction.

The potassium ferricyanide reaction did not give satisfactory results. The test solution was prepared as above described from clear crystals of potassium ferricyanide, previously washed with distilled water to free it from any adherent ferrous salt, which might have formed by exposure to light. By reduction with the ferric chloride it produced a pure yellowish brown color, without a bluish shade, proving the absence of ferrous salt.

(*a*) When diluted with distilled water, it remained unchanged during twelve hours.

(*b*) A 1 per cent. solution of dextrin in distilled water caused almost immediate reduction and consequently a blue color.

(*c*) The reaction with finely powdered gum arabic proved somewhat less rapid than that with pure dextrin, but the blue color was produced within twenty minutes (powder free from dextrin by iodine test).

(*d*) Powdered gum arabic, adulterated with dextrin, reduced the solution after a few minutes' time.

(*e*) When a tear of the gum was dropped into the solution of potassium ferricyanide, the solution did not acquire a blue color within two hours; but after standing a few minutes the outer surface of the tear of gum was colored a decidedly bluish tinge. When a tear of the gum was powdered, and then some of the potassium ferricyanide solution added, reduction with formation of a blue color took place more rapidly, agitation increasing the action.

Is it not possible that the drying of the gum or that other influences cause a change to take place in the gum acacia, which might account for the reaction with alkaline cupric tartrate and potassium ferricyanide solutions?

In order to determine the quality of the commercial powdered acacia, the samples were obtained, as far as possible, from the source of supply of the market, though the majority were obtained in pharmacies in Ohio, Indiana, New York, Pennsylvania and New Jersey.

All the samples were tasteless, and all reduced Fehling's solution, as described in the first part of this contribution.

TABULATED RESULTS OF EXAMINATION.

| Sample. | Color of Sample. | Color of Solution. | Dextrin. | Starch | Color, when Heated with KOH. |
|---|---|---|---|---|---|
| U. S. P. . . . . | Almost white. | Very light. | None. | None. | Amber. |
| Gran. gum | White. | Very light. | None. | None. | Amber. |
| Powder *a* . . | White. | Yellow. | None. | None. | Amber. |
| " *b* . . . | White. | Yellow. | None. | None. | Amber. |
| " *c* . | Gray. | Dark brown. | None. | None. | Yellowish-brown. |
| " *d* . . . | White. | Very light. | None. | None. | Amber. |
| " *e* . . | Yellowish. | Yellow. | None. | None | Amber. |
| " *f* . . . | White. | Light. | None. | None. | — |
| " *g* . . . | White. | Light. | None. | None. | Amber. |
| " *h* . . . | White. | Yellow. | None. | None. | Amber. |
| " *i* . . . | White. | Light. | None. | None. | — |
| " *k* . . . | White. | Light. | None. | None. | — |
| " *l* . | White. | Light. | None. | None. | — |
| " *m* . . | White. | Very light. | None. | None. | Amber. |

These results seem to indicate that the cheaper grades of gum are most frequently employed in the preparation of the powdered article, and that adulteration with dextrine is not generally practised.

Of course, the samples examined were only such as are used in pharmacies; and, no doubt, for technical purposes, one might be able to purchase gum wherein dextrin might be revealed.

To all who have favored me with samples of the gum, my sincere thanks are due.

CINCINNATI, O., March, 1897.

## PROXIMATE ANALYSIS OF ORRIS ROOT.

BY S. ALLEN TUCKER.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 162.

What is known in commerce as orris root is the rhizome of Iris florentina, which has been deprived of its cortex and dried by exposure to sunlight. Orris root has a delicate aroma, and for this reason it finds extensive use in the manufacture of perfumes, floral extracts and tooth-powders. For these purposes the prepared rhizome

is reduced to a granular form or a fine powder. It was on account of the extensive use of orris root, and because no statement of the effect of solvents on the article is given, that the writer undertook this proximate analysis. It is well known, however, that some of the proximate principles have been pretty thoroughly investigated by Dumas, Landerer, Flückiger and Hager; especially is this true of the volatile oil and its stearopten.

A sample of the granular form of the prepared rhizome was ground to a very fine powder. Petroleum ether extracted wax and fat to the extent of 1·34 per cent. Ethyl ether afterward dissolved 1·83 per cent. of substances which were soluble in alcohol and benzole, but not soluble in acidulated water. This extract had a strong odor of orris root. The substances to which this odor was due were not soluble in water. The alcoholic solution of the extract gave precipitates with alcoholic solutions of ferric chloride and lead acetate.

Absolute alcohol removed 4·13 per cent. of the weight of the rhizome. About three-fourths of the extract were soluble in water. This solution contained small amounts of glucose and sucrose. It gave a precipitate with lead acetate solution.

The distilled water extract amounted to 14·02 per cent. This included 8·31 per cent. of glucose, 1·27 per cent. of sucrose and a small amount of substances precipitable by alcohol. The total organic solids dissolved by water made alkaline with sodium hydrate were found to be 30·30 per cent. This extract consisted almost entirely of mucilaginous and albuminous substances which were precipitated by acidifying with acetic acid and adding a large volume of alcohol. Water acidulated with hydrochloric acid extracted 10·30 per cent. of organic matter. Starch was present to the extent of 16·85 per cent. A cold infusion of the rhizome gave no precipitate with gelatin for tannin. The sample of orris root examined contained 8·74 per cent. of moisture and 2·12 per cent of ash. The ash contained calcium, magnesium and potassium as carbonates, chlorides and phosphates.

In addition to the foregoing percentages representing the extracts, starch, moisture and ash, 10·37 per cent. of cellulose and undetermined substances were present.

# MARRUBIIN AND ITS DICHLORINE DERIVATIVE.

By Harry Matusow.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 163.

This crystallizable principle, obtained from Marrubium vulgare, a plant belonging to the natural order Labiatæ, was first isolated by Mein in 1855, and investigated by Harms, to whom the former presented it for investigation.

Harms (*Archiv der Pharmacie*, No. 83, p. 144, August, 1855), then, upon investigation, ascribed to marrubiin the following properties:

"Marrubiin forms stellate groups of colorless needles; it melts at 148° C., and at a higher temperature it breaks up with the development of an unbearable odor; it is almost insoluble in water, easily soluble in alcohol—particularly in hot alcohol—and soluble in ether. Its taste is persistently bitter; and it possesses a tendency to become colored when exposed to the air."

The next investigator to take up the subject was Kromayer (*Archiv der Pharmacie*, No. 108, p. 258, 1861), who extracted the plant with boiling water precipitated the infusion with lead acetate, removed the excess of lead with hydrogen sulphide, and then concentrated the infusion to a syrupy consistence. He then obtained the crystals from the infusion by means of alcohol and purified them by treating with animal charcoal.

Kromayer's results, which were published simultaneously with the process of extraction briefly described above, were as follows:

"From ethereal solutions it crystallizes in colorless rhombic plates, or thick, four-sided, double, gypsum-like crystals.

"From alcoholic solutions it crystallizes in needles.

"The crystals are gritty between the teeth. On account of their sparing solubility in water, their bitter taste is not perceived until after being kept in the mouth for some time.

"Alcohol or ether dissolves it readily.

"The alcoholic solution tastes intensely bitter, and has a somewhat acrid after-taste.

"The alcoholic solution reacts perfectly neutral. Almost completely insoluble in cold water and only sparingly soluble in hot water.

"The hot-water solution of marrubiin tastes strongly bitter.

"On the addition of water to the alcoholic solution, the marrubiin separates as an oily liquid, and the mixture becomes milky; on adding some alcohol and allowing the solution to rest, the marrubiin crystallizes out in needles.

"When heated on platinum foil, marrubiin melts to a colorless liquid; more strongly heated, it gives off white fumes of a biting and irritating odor, and finally burns away completely without leaving any ash.

"When heated in a glass tube closed at one end it distills over in oily drops without leaving a residue, developing at the same time mustard-oil-like, piercing fumes.

"The melting point of marrubiin lies at 160° C.; on cooling it solidifies to a beautiful, radiating, crystalline mass.

"Marrubiin is not a glucoside. Concentrated sulphuric acid dissolves it rapidly, with a brown-yellow color. On the addition of water the color disappears with the separation of gray flakes.

"Concentrated hydrochloric acid, whether hot or cold, has no effect on marrubiin.

"Cold concentrated nitric acid does not affect it, but on heating dissolves it with a yellow color.

"Tannin does not precipitate a solution of marrubiin.

"By the action of alkalies, cold or warm, marrubiin is not perceptibly affected.

"Ammoniacal silver nitrate solution, on being boiled with marrubiin, is only slightly reduced. Marrubiin, consequently, is not an aldehyde-like body.

"Marrubiin is not precipitated by metallic salts, namely, ferric chloride, when applied, did not produce any change.

"In its properties marrubiin stands nearest to coumarin, $C_{18}H_6O_4$; to cinnameïn (meta-cinnameïn) $= C_{32}H_{14}O_4 = C_{14}H_7O, C_{18}H_7O_3$ (benzoyl-cinnamate); and to styracin $= C_{36}H_{16}O_4 = C_{18}H_9O, C_{18}H_7O_3$ (cinnamyl-cinnamate)."

In addition to the foregoing results quoted from him, Kromayer remarks that marrubiin is the first instance of a crystalline separated bitter principle from a plant belonging to the Labiatæ, a family which is so rich in ethereal oils, and that all the characters of marrubiin indicate its intimate relation to the ethereal oils.

In 1863 Harms published a second communication on the properties of marrubiin, in *Archiv der Pharmacie*, No. 116, p. 141.

In this case Harms obtained the bitter principle by treating the herb with three successive portions of hot water, evaporating the water extractions to a syrupy consistence, and treating them with alcohol; to the alcoholic solution he added a large quantity of sodium chloride and about one-third its volume of ether; the whole was then agitated and the separated ethereal layer, when drawn off and allowed to evaporate spontaneously, left tabular crystals of marrubiin, which, after two re-crystallizations from alcohol, appeared pure. From 25 pounds of herb Harms obtained 2 grammes of the crystalline bitter principle.

With reference to the properties of marrubiin, Harms says he found them, in general, to agree with those given by Kromayer.

An elementary analysis, which Harms made on a portion of the crystals presented to him by Mein, yielded from 0·313 gramme of the principle, dried at 90°–100° C., 0·240 gramme of $H_2O$, or 8.52 per cent. of H. The carbon estimation, unfortunately, was lost, but it showed that the marrubiin contained more than 69 per cent. of carbon. Harms also stated that on recrystallizing marrubiin from hot solutions a portion of it assumes an amorphous form. On dissolving the amorphous bitter principle in alcohol, and allowing the solution to stand at the ordinary temperature in the air, it goes over into its original form, and separates in a crystalline, wart-shaped mass. Marrubiin crystallizes easily—best when to a boiling alcoholic solution boiling water is added until it begins to become turbid, and the solution allowed to cool slowly.

In the AMERICAN JOURNAL OF PHARMACY for June, 1890, Hertel published the following experience:

On making a fluid extract of marrubium, using diluted alcohol as a menstruum, it was noticed that, after standing for a week, a deposit of well-defined crystals separated from the extract. The deposit from 10 pounds of herb was nearly 1 ounce, the extract, however, still being as bitter as before. The slight yellow color of the needle-shaped crystals was removed by several recrystallizations from alcohol. The crystals still retained their slowly-developing but persistently bitter taste. When heated on platinum foil the crystals melted, then charred and finally volatilized without leaving any residue. They were quite soluble in chloroform, alcohol and ether, and slightly soluble in water. The principle is insoluble in benzin, is not colored by acids, does not respond to Fehling's

test for sugar, nor to the alkaloidal group-reagents, and from its alcoholic solution is not precipitated by lead subacetate. It crystallizes best from cold alcohol.

A menstruum prepared from 2 parts of alcohol and 1 part of water, with 5 per cent. of glycerin, yielded a fluid extract remaining free from crystalline deposit.

The investigation of marrubiin was next taken up by Morrison, who published his results in the AMERICAN JOURNAL OF PHARMACY, July, 1890. Morrison obtained the marrubiin by extracting the herb with ether, and purified it by repeated crystallization from hot 95 per cent. alcohol, and subsequent treatment with animal charcoal. Morrison describes the properties of marrubiin as follows:

The crystals were insoluble in water and in solution of potassium hydrate, very sparingly soluble in boiling water and in cold alcohol.

It is soluble in hot 95 per cent. alcohol, also in ether and chloroform. The crystals melt at 152°–153° C. They were at first tasteless, but developed, when held on the tongue, a decided bitterness. The alcoholic solution was very bitter. Sulphuric or nitric acid gave a dark brown color; hydrochloric acid produced no change, and ferric chloride produced no change. This principle reduced Fehling's solution by boiling in a water-bath, without first heating with an acid. On boiling it first with acidulated water, a peculiar aromatic odor was developed; then on heating with Fehling's solution, an abundant precipitate of cuprous oxide was produced, thus showing it to be an easily decomposable glucoside.

The average of two combustions was:

| | Found. Per Cent. | Calculated for ($C_{40}H_{58}O_9$.) Per Cent. |
|---|---|---|
| C | 70·25 | 70·38 |
| H | 8·42 | 8·50 |
| O | 21·33 | 21·12 |

The melting point of the marrubiin, obtained by Hertel, was also determined by Morrison and found to be 153·5°–154·5° C. Morrison remarks that this marrubiin was evidently nearly pure, and states that the average of three combustions made by him was:

| | Per Cent. |
|---|---|
| C | 70·54 |
| H | 9·08 |
| O | 20·38 |

Morrison further states that his results indicate the composition of marrubiin to be very close to that of absinthiin, $C_{40}H_{55}O_9$, a crystalline bitter principle obtained from wormwood, and described by Kromayer in *Archiv der Pharmacie*, No. 108, p. 120, but that it does not agree with all the properties described by Kromayer, who states that absinthiin melts at 120° to 125° C.

Thus far I have reviewed the history of marrubiin, and described the investigations and results of preceding workers. I shall now detail my own experience with the extraction of marrubium, for the isolation and purification of marrubiin, and describe the properties of that substance as observed by myself.

The herb was collected by the writer at Lawnside, N. J., in the months of July, August and September, 1896. It was carefully dried in a room, without exposure to direct sunlight. The herb was then finely ground, and trial extractions made with alcohol, benzol and acetone as menstrua, 500 grammes of the herb being subjected to the solvent action of each of the solvents named. Of the three different menstrua mentioned, acetone was found to be the most satisfactory one, extracting the largest quantity of the bitter principle and the least amount of foreign matter, with smallest quantity of menstruum.

Two and a half kilogrammes of the herb were now extracted with acetone, the acetone being, from time to time, recovered from the extract, and used again as menstruum. When the herb was practically exhausted, the acetone was recovered from the extract, by distillation, and the thick, syrupy mass which was left was treated repeatedly with hot benzol. The benzol solution was allowed to stand for twenty-four hours for marrubiin and resinous matter to separate. The mother liquid was then poured off, and the residue treated with a fresh portion of hot benzol and allowed to stand as before. This treatment was continued until relatively pure crystals of a yellowish color were obtained. The crystals were then repeatedly crystallized from hot alcohol, by solution and chilling, which, owing to the prevalent cool weather, afforded a rapid means of crystallization. They still retained a slight yellow tinge, which, however, was removed by treating them with animal charcoal. A portion of the syrupy mass obtained above, on distilling off the acetone, was treated repeatedly with hot alcohol, and allowed to stand for twenty-four hours after each treatment, without previous

treatment with benzol, but without success; the reason for this, I think, is the following: the crystals are accompanied in the extract, besides the coloring and other foreign matter, by what seemed to be a resinous substance, which was dissolved along with them by the alcohol, and separated with them from its solution, thus rendering it difficult for the bitter principle to crystallize; hot benzol, on the other hand dissolved the crystals and the resinous substance at first, but when allowed to stand for twenty-four hours, retained the greater part of the resinous substance in solution, and deposited the crystals with only a small quantity of the resinous substance adhering. When these impure crystals were treated with a fresh portion of hot benzol, the marrubiin was dissolved, but the contaminating resin, for the most part, did not go into solution. From the 2½ kilogrammes of herb extracted about 20 grammes of purified crystals were obtained.

These crystals melted at 154°-155° C., and on cooling solidified to a crystalline mass.

When treated with strong sulphuric acid a dark brown color was produced.

Strong nitric acid produced a similar reaction.

Strong hydrochloric acid produced no change, even on heating.

When Fehling's solution was heated with a hot-water solution of marrubiin on a water-bath for thirty minutes, it was not reduced.

Fehling's solution, when heated on a water-bath for thirty minutes with a hot-water solution of marrubiin, which had previously been boiled with hydrochloric acid, was not reduced.

The alcoholic solution of marrubiin has a neutral reaction.

The alcoholic solution of marrubiin, when treated with alcoholic ferric chloride, was not changed; alcoholic lead acetate produced no change; alcoholic tannin solution produced no change; ammoniacal silver nitrate solution, in the cold, was not reduced by a hot aqueous solution of marrubiin; the same reagent when heated in a water-bath was not reduced; but as the solution became more concentrated, the marrubiin gradually separated from solution on the bottom of the tube.

The alcoholic solution, as well as the crystals, had a persistently bitter taste. On the addition of water, the alcoholic solution becomes turbid white. Marrubiin crystallizes in lustrous needles arranged in star-shaped groups, from hot alcohol when not concen-

trated. From concentrated hot alcoholic solutions, it crystallizes in dull-white plates.

It is soluble in acetone, ether, alcohol, chloroform, but most readily in hot benzol.

It is insoluble in petroleum benzin and cold water, and only sparingly soluble in hot water.

Marrubiin, when tested for nitrogen, by fusing a small quantity of it with a fragment of metallic sodium, agitating the heated mass with water filtering, and adding ferrous sulphate, ferric chloride and hydrochloric acid in excess, did not give the characteristic blue precipitate or color of ferric ferrocyanide, $(Fe_2)_2\ (Fe\ (CN)_6)_3$, thus indicating the absence of nitrogen.

The crystals obtained by recrystallization from hot alcohol, previous to being treated with animal charcoal, melted at 158°-159° C. They were subjected to ultimate analysis; the combustions were made in an open tube with copper oxide and a current of oxygen, the substance being, in all cases of combustion, previously dried in a desiccator over sulphuric acid for twenty-four hours.

The following are the results of two combustions:

(1) ·1931 gramme of the substance yielded:

| | | |
|---|---|---|
| ·5113 gramme of $CO_2$ = | 72·19 per cent. of C. |
| ·1500 " " $H_2O$ = | 8·59 " " " H. |
| | 19·22 " " " O. |
| | 100·00 |

(2) ·1659 gramme of the substance yielded:

| | |
|---|---|
| ·4414 gramme of $CO_2$ = | 72·57 per cent. of C. |
| ·1293 " " $H_2O$ = | 8·68 " " " H. |
| | 18·75 " " " O. |
| | 100·00 |

The crystals were then recrystallized six times from hot alcohol, and a second determination of the melting point gave the same result as that obtained in the previous case, viz.: 158°–159° C.

They were, therefore, treated with animal charcoal in several successive applications, and the melting point, as proven by several trials, was found to be 154°–155° C. A combustion of the purified substance showed the following to be its percentage composition,

which is practically the same as that previously obtained; ·1654 gramme of the substance yielded:

| | | | |
|---|---|---|---|
| ·4372 gramme of $CO_2$ | = | 72·07 | per cent. of C. |
| ·1305 " " $H_2O$ | = | 8·77 | " " " H. |
| | | 19·16 | " " " O. |
| | | 100·00 | |

The average of the three combustions was:

| | Found. Per Cent. | Calculated for ($C_{30}H_{43}O_6$). Per Cent. |
|---|---|---|
| C | 72·28 | 72·14 |
| H | 8·68 | 8·62 |
| O | 19·04 | 19·24 |
| | 100·00 | 100·00 |

My results confirm Kromayer's, in general, excepting the melting point, which he determined to be 160° C. They also differ from the melting point stated by Harms to be 148° C.

The melting point obtained by myself is nearest to the one obtained by Morrison.

My results show that marrubiin is not a glucoside; so they also differ in that respect, as well as in the matter of its formula from the results obtained by Morrison.

*Dichlorine Derivative of Marrubiin.*—A small quantity of marrubiin was dissolved in ether and dry chlorine gas passed into the ethereal solution, until no more of the gas was absorbed.

The ethereal solution, which was of a yellow color, was divided into two portions, one portion being allowed to evaporate and the other poured into an excess of water. The portion poured into the water was stirred, the water poured off and the precipitated substance washed with successive portions of water and carefully dried. When dry, it was found in the form of a yellowish-white, hard, wax-like mass, adhering to the sides of the beaker. The portion of the ethereal solution which was allowed to evaporate left a thick, oily, yellowish-brown substance, which, when redissolved in ether and allowed to evaporate several times and then washed repeatedly with water, assumed a form similar to the substance obtained by pouring a portion of the ethereal solution into water.

A preliminary test for chlorine was made by heating a small por-

tion of the thoroughly washed substance with chlorine-free calcium carbonate on platinum foil. The mass was allowed to cool, then dissolved in water by the aid of nitric acid, and silver nitrate, T. S., added. This reagent produced a white, curdy precipitate of silver chloride insoluble in nitric acid.

To estimate the chlorine quantitatively, ·0813 gramme of the chlorine derivative was intimately mixed with chlorine-free calcium carbonate, and heated in a glass tube, closed at one end, until the carbon was completely burned off. The tube was then broken, and it and the contents were introduced into a beaker. Water was added, and the whole warmed and complete solution of contents effected by the aid of nitric acid. The solution was filtered clear, the filter carefully washed, adding the washings to the filtrate, and then precipitated with silver nitrate. The precipitate was collected. washed with hot water and dried at 130° C. to constant weight. The weight of silver chloride so produced was ·0425 gramme, which corresponds to ·0105 gramme of chlorine, or 12·91 per cent. of the weight of the derivative taken. Assuming that one hydrogen atom is replaced by every chlorine atom introduced, the formula of the derivative—admitting the formula for marrubiin to be $C_{30}H_{43}O_6$—would be $C_{30}H_{41}Cl_2O_6$, the theoretical amount of chlorine in which is 12·47 per cent.

Marrubiin dichloride is a yellowish-white, hard, wax-like substance, soluble in ether and alcohol, from which solvents, however, it could not be obtained in crystalline form, even after repeated attempts at crystallization.

When heated it becomes transparent at 63° C.

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## NOTE ON OINTMENT OF MERCURIC NITRATE.

By JOSEPH W. ENGLAND.

Probably no official ointment has been more carefully studied than has the familiar citrine ointment. To the physician its medicinal action is peculiar and full of interest. Through its free nitric acid, when applied to an epidermis more or less altered by pathological change, it rapidly penetrates the superficial tissue, and sharply stimulates the subdermal tissue to absorb the soluble mercuric salt, thus inducing a local, and possibly, to some extent, a constitutional alterative action. The danger of salivation from a too

speedy absorption is such that many physicians dilute the ointment with fatty diluents in all cases, save those requiring strong stimulation. Whether the elaidin of the ointment is of any value in promoting absorption or not has not been determined.

Not alone from the medical standpoint, however, has the ointment been of interest, but its making has been the fruitful source of much study by pharmacists. Under the title of "Unguentum Hydrargyri Nitratis," an able paper by P. W. Squire, has been published in the *Pharmaceutical Journal* of London (February 27, 1897, 172), in which are given the results of experiments upon the nature of the fat, the relative quantity of nitric acid, and the manipulation used in making the ointment. Especial attention is paid to the differences between the processes of the British and United States Pharmacopœias. It is not necessary to here dwell upon these, save only in a general way.

Regarding the fat to be used, Mr. Squire prefers the British Pharmacopœia mixture of lard and olive oil, rather than the lard oil of the United States Pharmacopœia. He says that with lard oil the oxidation takes place at a lower temperature than with lard and olive oil, the resulting product being somewhat darker; otherwise, he frankly adds, there is not much to choose between the two fatty bases.

The relative quantity of nitric acid used in the B.P. process is considerably more than in the U.S.P., and while the U.S.P. treats the lard oil with a part of the nitric acid previous to the addition of the solution of mercuric nitrate, the B.P. directs that the acid solution of mercuric nitrate be added to the ointment base without any previous treatment with acid. The advantage of the first procedure over the sceond Mr. Squire admits, giving an alternative formula based on the B.P. formula, in which the fatty base is treated with half the nitric acid before the mercurial solution is added.

Mr. Squire finds that the temperature at which effervesence takes place varies with the nature of the mixture of acid and fat. With nitric acid and lard oil the reaction is slight at 100° C. (212° F.) and brisk at 110° C. (230° F.); with nitric acid, lard and olive oil, the reaction takes place at 120° C. (248° F.); with acid solution of mercuric nitrate and lard oil it occurs at about 90° C. (194° F.), and with acid solution of mercuric nitrate, lard and olive oil, at 95° C. (203° F.). The relatively higher temperatures of the first two in-

stances have no practical bearing if there be no mercuric salt present.

The important practical point to observe is that the temperature be kept low *after* the addition of the mercuric solution, when the tendency to blacken increases as the temperature rises. This change will occur even if the ointment be kept at 100° C. (212° F.) for anything like an hour, and possibly in much less time.

The interesting nature of Mr. Squire's communication suggested to the writer the advisability of reporting its data to American pharmacists, and also of making a few practical suggestions regarding the present U.S.P. process.

The following formula is suggested for trial:

| | Grammes. |
|---|---|
| Red mercuric oxide | 75·5 |
| Nitric acid | 175· |
| Lard oil | 760· |

Heat the lard oil in a glass or porcelain vessel to 100° C. (212° F.), withdraw heat, and gradually add 75 grammes of nitric acid. When the reaction moderates, reapply the heat until brisk effervescence takes place, and then withdraw heat until active effervescence subsides. Then gently heat until effervescence ceases. (During the effervescence stir the mixture with a wooden spatula or paddle.) Allow the mixture to cool to about 60° C. (140° F.). Having dissolved the red oxide of mercury in 100 grammes of nitric acid, with the aid of sufficient heat, add the solution gradually to the oxidized fat, and stir the product until cold. When nearly cold, add 50 grammes of glycerin, and admix thoroughly.

The advantage in using red mercuric oxide over mercury rests in the fact that small quantities of it are more easily weighed, and it is probably purer than commercial mercury. If it be desirable to employ red mercuric oxide for making the official solution of mercuric nitrate, it should be equally useful in making the ointment. The small quantity of water formed in the reaction is of no practical moment.

In the U.S.P. process, no directions are given for stirring the fatty mixture during oxidation, and the inference is that such a practice is to be tabooed. As a matter of fact, a diligent stirring of fat and oxidizing material facilitates oxidation, and in the writer's opinion is of decided advantage in hastening the end-reaction. If the

ingredients be not stirred during effervescence, there is a danger that the contents may be thrown from the container.

The reaction between the fat and acid is sometimes slow in responding, and when it responds it does so very quickly. For this reason the writer prefers to withdraw the heat on active effervescence, and then after the reaction is in operation, to heat gently until effervescence ceases, rather than to follow the official directions of heating until effervescence ceases after the addition of acid with primary reaction.

There is no apparent need of waiting until the temperature of the oxidized fat falls to 40° C. (104° F.) before adding the mercurial solution. Squire cools his product to 60° C. (140° F.), and this would seem to be a low enough temperature.

The red oxide of mercury "lumps" slightly on adding it to the acid, but heat soon brings it into solution.

Objection may be made to the addition of glycerin to ointment of mercuric nitrate, on the ground that nitro-glycerin may be formed. The objection is not well founded. The production of nitro-glycerin requires a large excess of concentrated sulphuric acid over the quantity of nitric acid used in order probably to absorb rapidly the water formed in the reaction, as follows:

$$C_3H_5\,(OH)_3 + 3NO_2{\cdot}OH = C_3H_5\,(NO_3)_3 + 3H_2O$$

This condition does not obtain in this ointment. In addition, the fat present doubtless inhibits such a change. Further, the writer has followed the practice of adding glycerin to the ointment for three years past, and there has been no complaint of untoward therapeutic effects, as there would have been had any nitro-glycerin been present; the latter is rapidly absorbed by the skin.

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## AQUA PURA.

*Editor* AMERICAN JOURNAL OF PHARMACY.

DEAR SIR:—In consideration of the condition of the drinking water supplied to the citizens of Philadelphia and some other cities, too, by their public works, it seems to me there is an excellent opportunity for the pharmacist to do a stroke of business as well as to assist his suffering fellow-beings to preserve their lives and enjoy a drink of pure water while still living. My suggestion is that

he constitute himself a purveyor of pure drinking water to his customers and neighbors by supplying them with filtered water. He can either sell this pure filtered water at a merely nominal price, say, 4 or 5 cents a gallon at his store, not delivered, or else give it away as an advertisement, and which, I think, would be more profitable than the selling of postage stamps for a similar purpose.

There are several good filters on the market that can be attached to the hydrant in the store, and need no attention except for cleaning every two or three days, and a proper receptacle for the filtrate; they will work on day and night alone. From this arrangement down to simple filtration through paper with a little magnesia, many ways of filtration will occur to the competent and skilful gentlemen for whose information and ultimate benefit this hint is intended.

I fancy I can see an extensive and profitable application of this hint to the business of many pharmacists.

A little admixture of plain carbonated water added to the filtrate would make it sparkle and be an improvement possibly.

The highest-priced filter on the market that I know of, filtering about 10 gallons an hour when clean, can be put up for $25, perhaps less, and from this through an endless variety of filters and methods, home-made or otherwise, the outfit can be reduced to a very small sum, according to quantity of filtered water required or attention needed to keep the work continuously going on.

Yours truly,

PRO BONO PUBLICO.

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## COMMON SENSE ON THE ALCOHOL QUESTION.[1]

However temperate a man's own views may be on any such question as that of the use of alcohol, he is tempted to lean in his public utterances toward the contention of fanatics. He may not go to the extremes that they contend for; indeed, he is almost sure not to. But he is apt to make statements by which they can strengthen their case with the public and especially with the legislators. It is refreshing to notice a recent exception in the case of Mr. Pellew, of the department of chemistry of Columbia University, who recently

[1]Editorial in *New York Medical Journal*, March 8, 1897.

concluded a course of lectures in the Museum of Natural History on the subject of the good and bad effects of alcohol.

Mr. Pellew stated without reserve, and backed up his statement by citing the most careful observations and experiments of well-known investigators, that "there was no doubt that, even in health, a small amount of alcohol, if given in divided doses, could be burned up in the blood and serve as food, without producing any injurious effects." We are quoting from the *Sun's* report of Mr. Pellew's last lecture. He went on to say that in diseased conditions, where nutrition was impaired, alcohol could be given in greatly increased amounts without any intoxicating effect, and was then of enormous value. An ounce of it, he said, gave as much heat as seven or eight ounces of beef, and that without having to undergo the process of digestion and assimilation. In other words, it burned, "as in a lamp, without wasting the wick."

On the other hand, the popular notion that alcohol will keep up the heat of the body under exposure to great cold was declared to be a mistake. Alcohol, said Mr. Pellew, actually reduced the temperature of the blood, but it was of service to restore equilibrium after the exposure was over. The lecturer was not backward in depicting the horrors of drunkenness, to which, of course, no reasonable man can shut his eyes. He spoke of the dram-drinking habit as a nervous disease rather than a vice. He properly insisted that, in health, the only good effects of alcohol, "except, indeed, its action as a 'scavenger of mankind,'" came from its moderate use.

To show the astonishing amount of intemperance in the so-called temperance doctrines at present promulgated, Mr. Pellew read passages from the books on "physiology" to which the law now requires the teachers and pupils in the public schools of the State of New York to devote a large proportion of their time. He pointed out the "absurd doctrines, not to say absolute falsehoods," which in many cases were thus crammed into the children's heads. The *Sun's* account concludes as follows: "In his opinion it is confusing to a child to learn that it is a sin to pick a pocket and to drink a glass of wine, and he suggested the state of mind of a Teutonic father or grandfather, when his young hopeful would read to him, from his school books, how the 'use of beer, more than of any other liquid, tends to make the drinker selfish, cruel and brutal.'"

# RECENT LITERATURE RELATING TO PHARMACY.

## SOME COLOR REACTIONS OF TARTARIC, CITRIC AND MALIC ACIDS.

According to E. Pinerua (*Annales de Chimie Analytique*, 2, 66), the reagent for producing these color reactions is made by dissolving 0·02 gramme of $\beta$-naphthol in 1 c.c. of sulphuric acid, specific gravity 1·83.

The test is made by warming cautiously in a porcelain capsule 0·05 gramme of the organic acid with 10 to 15 drops of the reagent.

*Tartaric acid*, when thus treated, produces a blue color, which, under the gradual action of heat, becomes a pure green. If to the cooled mixture 15 to 20 times its volume of water are added, the green coloration passes to a reddish-yellow.

With *citric acid* the color at first produced is an intense blue, which does not become green on the further application of heat, and the mixture becomes colorless or only slightly yellow on the addition of 15 to 20 times its volume of water. If the citric acid contain only a small quantity of tartaric acid, the green color is produced by the latter.

*Malic acid*, when treated like the others, produces a greenish-yellow, quickly passing to yellow. The addition of water furnishes an orange color. All the reactions are produced quickly, and care and judgment must be used in applying heat.

## THE ALLEGED CONVERSION OF CINCHONINE INTO CINCHONIDINE.

Messrs. B. H. Paul and A. J. Cownley (*Pharmaceutical Journal*, February 20, 1897) have investigated the alleged conversion of cinchonine into cinchonidine and reached the following conclusions with reference to their experiments: An endeavor to corroborate Koenig and Hussmann's statement as to the possibility of converting cinchonine into cinchonidine by the action of dilute potash was unsuccessful. The authors stated that if the supposition be made that the base obtained was really cinchonidine, it must be presumed that the cinchonine operated upon had not been sufficiently purified. It is well known to quinologists that the cinchona alkaloids are very prone to form double compounds with each other, either as alkaloids when separating from various solvents, such as ether and alcohol—the latter having been used by the authors—or as salts from aqueous solutions. Cupreine, for instance, which they isolated from Remijia pedunculata, forms a compound with quinine, viz.: homo-

quinine, which reacts whether as an alkaloid or as a salt, differing in many respects from either cupreine or quinine.

ESTIMATION OF MORPHINE IN OPIUM AND ITS PRINCIPAL PREPARATIONS.

Al. Grandval and H. Lajoux (*Jour. de Pharm. et de Chim.* [6], **5**, 153) recommend a process for the estimation of morphine which they claim is easy and rapid of execution, and yields a pure white morphine.

Opium is estimated by taking 10 grammes, triturating in a glass mortar with 40 grammes of distilled water, until the drug is finely divided, throwing on a folded filter and washing the mortar with 40 grammes of water, which are also poured on the filter. The mass is allowed to drain well, the filter and its contents are then returned to the mortar and triturated with 40 grammes of water added in several portions. The whole is then poured on a plain filter and washed with water until the washings are free from color and taste. The filtered liquid and washings are then evaporated on a water-bath to 13 grammes; to this residue are added 13 grammes of 95° alcohol, and the mixture is allowed to stand a half hour for the sulphate and meconate of calcium to deposit; it is then filtered through a small filter moistened with 60° alcohol, and the filter and precipitate are washed with alcohol applied drop by drop, so that not more than 10 grammes of alcohol have been used when the washing is complete. The edges of the filter are kept from drying during the washing by covering the funnel with a watch crystal. Ammonia is next added, drop by drop, to the liquid until the odor is just apparent, and the whole is agitated for some minutes, then set aside for twelve hours in a cool place. The precipitate of morphine and narcotine is collected on a plain filter, previously dried at 100°, tared and moistened with alcohol of 60°. When the liquid has run through, the precipitate is washed with alcohol of 40° until the filtrate runs colorless, when not more than 25 c.c. should have been used. The filter and its contents are then dried at 100°, weighed and returned to the funnel, where 5 c.c. of ether are added in order to permit the morphine being moistened by the chloroform; then 10 grammes of chloroform are added, which dissolve the narcotine. Finally the morphine and filter are dried at 100° and weighed. The morphine, being in the state of hydrate and crystalline, is not dissolved by the chloroform, which only dissolves morphine when in the state of anhydride.

Extract of opium is assayed by dissolving 5 grammes of the extract in 5 grammes of water, adding 5 grammes of alcohol of 95°, allowing to stand, and then transferring to a plain filter moistened with alcohol of 60°. The precipitate is washed with alcohol of 40°, there being required about 10 c.c.; the operation is then conducted in the same manner as under opium.

The liquid preparations of opium are assayed by slight modifications of the process which readily suggest themselves.

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# EDITORIAL.

## SUBSTITUTION.

There has been a great deal said at the National and the various State Pharmaceutical Associations about substitution, and it is probable that much more will be said this year than ever before. It is scarcely necessary, however, to waste much time on a subject in which the plain line of duty is so clearly marked out for the pharmacist. Certainly, every physician has a right to specify any particular manufacturer's preparation, and the patient has a right to receive it. If the pharmacist to whom the prescription is presented for compounding does not care to furnish the product of the specified manufacturer, he has a right to decline and to return the prescription. He has no right, however, to substitute his own or anybody else's preparation for the one specified, even if he is sure the substitute is as good or, as he may think, better.

It is only justice to Fairchild Brothers & Foster to give them credit for going to considerable expense to bring certain guilty parties to justice, who have been palming off, not only substitutes but poor substitutes, in prescription for their essence of pepsin. The pharmacist who does not wish to dispense anybody's preparation but his own has a remedy; he can visit the physicians in his locality, load them up with samples of his own manufacture, and perhaps convince them that they are the best. At the same time it will pay him, morally, legally and financially, to supply just what is ordered.

## THE EVOLUTION OF THE NOSTRUM.

We sincerely trust that certain nostrum manufacturers will not garble the preceding remarks and publish them as reading matter (paid for at double the advertising rates) in the newspapers; they are not intended for the patent medicine nabobs.

Substitution, as already defined, is almost impossible in the sale of patent medicines, but at the same time the products of the retail druggist are in many localities taking the place of nostrums. This has been brought about by the education of the public by the pharmacist as to the real nature of the numerous patent remedies whose virtues lie more in printers' ink than in intrinsic merit. To offset this disastrous warfare against their remedies, the nostrum manufacturers resort frequently to paragraphs like the following, which start in the city papers and gradually find their way into those of the smallest country towns :

## GET WHAT YOU ASK FOR.

**Certain Druggists Who Bring Reproach Upon Their Business by the Practice of Palming Off "Substitutes" on the Public.**

When a person goes to a drug store for a standard remedy and the druggist tries to palm off some other preparation of a pretended similar nature, urging the customer to buy the latter concoction on the plea that "it is just as good" or "really better" than the standard remedy called for, it is proper to avoid that drug store ever afterwards.

The profit to the druggist on the standard preparations is not large. The few remedies that the whole world recognizes as meritorious are prepared by able physicians and chemists, with every facility of modern science at their command, from the formulas of the most learned physicians that this generation has produced. A tremendous amount of capital is invested in the laboratories where these remedies are made. They have gained their reputations by the great good they have done in curing disease and relieving pain. It costs a great deal to keep up their necessary excellence.

The unscrupulous and generally ignorant druggist referred to sees a chance to make a big profit by mixing together a number of cheap ingredients, giving the mixture a name, and taking advantage of the gullibility of some people, who seem to like to experiment with their health. These preparations are frauds, and are never advertised, because they will not bear the light of any public investigation.

This appeared as reading matter in the Philadelphia *Public Ledger*, and claimed to have been taken from the *Boston Globe*.

What is the "standard remedy" spoken of?

Evidently, from what follows, it is one which has been advertised.

When a customer asks for one of these so-called standard remedies, the pharmacist will not go far astray if he undertakes a little missionary work, and either sends the patient to a physician or supplies him (after due recommendation) with a standard preparation of his own manufacture, which, perhaps, has not been so extensively advertised, but which has real merit. The editor who admits such "stuff" and calls it reading matter should be waited on by the druggists of his locality and be enlightened as to the real facts of the case. Such notices have appeared quite frequently of late, and, no doubt, will continue to appear unless some active measures are taken by pharmacists. They indicate the desperate efforts of the nostrum manufacturers to neutralize the warfare which is being waged by druggists in nearly every part of the country against the patent medicine; but sooner or later the persistent aggressiveness of the 40,000 druggists in the United States will win. It is nonsense to talk of going back to the day of 33 or 50 per cent. profits on "patents," nothing moves that way in this world, the process of evolution is seen in everything, and this

miserable patent medicine traffic cannot go backward, it must gradually grow into something which we trust will be better.

A TESTIMONIAL TO PROFESSOR ATTFIELD.

The retirement of Dr. Attfield from professional life is an event in the history of pharmacy which should be marked by an acknowledgment of his long labors and important services.

Now some of his past pupils, who have been students personally, or students of one or more of the fifteen editions of his Manual of Chemistry, also a few of his public friends, have decided that the time has arrived for them to show, in some appropriate manner, the esteem and warm regard they have for him, and to ask fellow-students and their friends to join them in a scheme for this purpose.

Just what form the recognition will take has not been settled. Those who are willing to join in this testimonial should address Mr. John Moss, 39 Tressillian Road, London, S. E., for circulars and other information. The cash contribution, if any, is not to exceed ten shillings.

OHIO PHARMACEUTICAL ASSOCIATION.

The pharmacists of Ohio have decided to hold their annual meeting this year in Cleveland, during the second week of June. Detailed information can be had of Lewis C. Hopp, Secretary, 198 Euclid Avenue, Cleveland, Ohio.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

North Carolina and Its Resources. Illustrated. Issued by the State Board of Agriculture, Raleigh, N. C., 1896. 8vo., pp. 413.

This handsomely illustrated volume opens with a historical and general sketch of the State, and then treats of climate, forests, flora, fauna, geology, economic minerals, gems and gem stones, agriculture, horticulture, education, etc., etc. North Carolina has long been known as a State rich in economic products, and this book will do much to extend the knowledge of these products. The flora is especially rich in medicinal plants, and the supply of many native vegetable drugs has for years come from this State. The Welsbach and other incandescent lamps are dependent on the supply of monazite from McDowell and adjoining counties.

Biltmore, the famous estate of the Vanderbilts, receives careful consideration in this book, and it is shown to be a superior educator in agricultural matters to the farmers of the State.

Leaving the mountainous districts, as we approach the coast we find the turpentine industry of great importance. The annual value of the resinous products sold from the State aggregates over $1,500,000, being, in fact, about one-third of the entire product of these commodities in the world. On the coast the fish industry is of considerable magnitude. On reading this book one is almost forced to the conclusion that North Carolina is able to produce, within her boundaries, everything necessary for the comfort and well-being of the human race, and therefore is capable of being a small world within herself.

Die Fabrication der Künstlichen Mineralwässer und anderer Moussirender Getränke. Von Dr. B. Hirsch und Dr. P. Siedler. Dritte neu-bearbeitete Auflage. Druck und Verlag von Friedrich Vieweg und Sohn, Braunschweig. 1897.

The whole subject of mineral waters is comprehensively treated under the following titles : *A*, Mineral waters in general ; *B*, half-natural mineral waters ; *C*, artificial mineral waters ; *D*, mineral-water ingredients ; *E*, apparatus ; *F*, preparation of mineral waters ; *G*, calculation of analyses ; *H*, artificial medicinal waters not occurring in nature ; *I*, testing of artificial mineral waters ; *K*, beverages ; *L*, laws, etc. In the first chapter the general subject is concisely and interestingly stated. The half-natural mineral waters are those which, on account of their agreeable taste, are desirable for table waters, but it is found necessary to fortify them by a further proportion of carbon dioxide, and, in some cases, also by the addition of common salt.

Much valuable information is given concerning the composition of natural mineral waters, and how the various acids and bases are combined with one another. Attention is called to the fact that many of these bases and acids do not ordinarily occur together in solution, but that their presence in the same mineral waters is made possible by carbon dioxide, and, in some cases, heat and pressure.

That portion of the book devoted to mineral water apparatus and the preparation of artificial waters is very full. Much of the apparatus is figured in the beautiful manner of Vieweg & Son, and for which they have a world-wide reputation.

The manufacture of carbonated waters is described in detail and fully illustrated. The manufacturer, chemist and pharmacist will all find this book one of value.

The Year-Book of Treatment for 1897. A critical review for practitioners of medicine and surgery. Lea Brothers & Co., Philadelphia and New York, 1897.

The thirteenth issue of the "Year-Book of Treatment" has appeared, with but few changes in the staff of contributors. Every branch of medicine has received careful attention in this summary. The conclusions regarding antitoxine are quite full, and the weight of evidence in favor of it as a remedial agent is overwhelmingly in the affirmative. The chapter on therapeutics of the year is chiefly in reference to new remedies, and contains much information of especial value to pharmacists.

Annual of the Medical Sciences and Analytical Index. A yearly report of the progress of the general sanitary sciences throughout the world. Edited by Charles E. Sajous, M.D., Paris, and seventy associate editors. Five volumes. The F. A. Davis Company, publishers, Philadelphia, New York and Chicago.

The editor states in the preface to Volume I that his aim has been to add to the practical value possessed by the previous issues. From a general examination of the work, we can say that he has fully accomplished his purpose.

Rapport de Mission a la Martinique et a Guyane. Par Emmanuel Geoffroy. Macon, France, 1897.

On account of the death of the author, the introduction to this report was written by Dr. E. Heckel, who clearly sets forth the object of the journey of exploration to Martinique and French Guiana ; this object was to find, if possible, in the French colonies, trees yielding caoutchouc or other substance that would take its place, and to determine if the Araucarias of Brazil were to be found in French Guiana. The author himself answered these questions in his conclusions, by stating that the search for the forests of Araucarias was completely fruitless, and he did not believe they existed in that colony, as they are very conspicuous trees, and could not have escaped the observations of Aublet, Guisan and others. On the other hand, the trees yielding milky juice coagulable by alcohol, the Balatas, were found in great abundance. They were, however, in difficultly accessible regions, covered by water for two-thirds of the year. The most favorable time for collecting the product was thought to be the comparatively short season while the ground was dry.

LES PLANTES MÉDICINALES ET TOXIQUES DE LA GUYANE FRANÇAISE. Par le Dr. Édouard Heckel. Macon, 1897.

The French nation is giving more attention than formerly to its colonies and their products : and this volume of ninety-three pages is evidence of an effort to render available the medicinal plants of French Guiana.

The descriptions of the various plants are arranged alphabetically, each having one or more common names, followed by the botanical name, natural order, part employed, its use and method of administration. Among those described are to be found some well-known representatives of our own materia medica, as for example, Phytolacca decandra and Ricinus communis ; the former is given as an introduced plant.

No one interested in the science of applied botany can read this contribution without being greatly benefited thereby, and the author, who has published it with the sole object of rendering some service to this branch of science deserves the gratitude of many outside of his own country.

DIGEST OF CRITICISMS ON THE UNITED STATES PHARMACOPŒIA. Seventh decennial revision (1890). Published by the Committee. Part I, pp. 183. New York, 1897.

The Committee has again been fortunate in securing the services of Mr. Hans M. Wilder in compiling this Digest. It is a valuable summary of nearly all the papers on the preparations of the Pharmacopœia to July 1, 1896. The book is not for sale, but copies may be obtained by remitting seven cents in postage stamps to Dr. Charles Rice, Bellevue Hospital, New York.

A RECALCULATION OF THE ATOMIC WEIGHTS. By Frank Wigglesworth Clarke. New edition, revised and enlarged. Published by the Smithsonian Institution, 1897.

The first edition of this work was published in 1882. Since then, new matter has been constantly accumulating, and the result in most cases has been a slight lowering of the figures representing the atomic weights of the elements. Clarke's figures are in nearly every case lower than those of Meyer and Seubert, which was published in the U.S.P. 1890. With hydrogen as 1,000, oxygen is given as 15·88.

CONTRIBUTION II TO THE COASTAL AND PLAIN FLORA OF YUCATAN. By Charles Frederick Millspaugh, M.D. Field Columbian Museum, publication 15. Botanical series, Vol. 1, No. 3. Chicago, December, 1896.

This is a valuable contribution to the botanical knowledge of the almost unknown country of which it treats.

PROCEEDINGS OF THE FIFTEENTH ANNUAL MEETING OF THE VIRGINIA PHARMACEUTICAL ASSOCIATION, held at Hampton, Va., July 21 to 23, 1896.

Several interesting papers add to the value of these proceedings. One paper, by Geo. E. Barksdale, is devoted to a description of a new form of percolator, to which a stirrer is attached.

COMPLETE PRICE LIST AND CATALOGUE OF PARKE, DAVIS & CO. Detroit, Mich., 1897.

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## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, March 17, 1897.

The sixth of the present series of Pharmaceutical Meetings was held in the College Museum at 3.30 P.M. J. W. England presided. The minutes of the last meeting were allowed to stand as published.

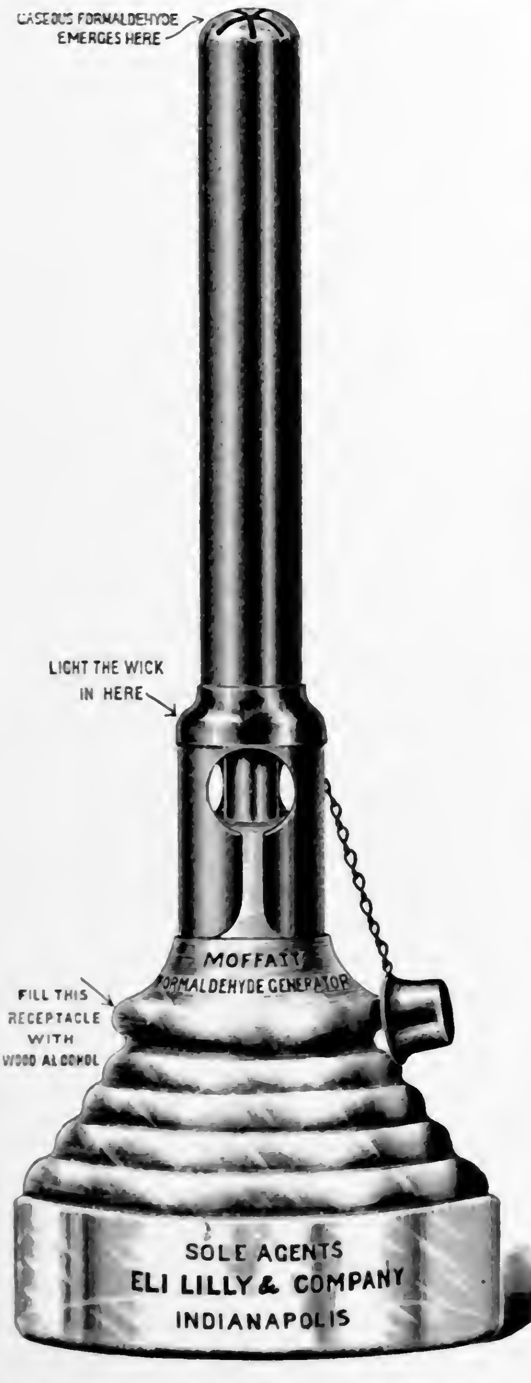
The chairman called for the presentation of specimens and the following were exhibited: A sample of the matrix of the diamond, which is a kind of blue clay, from Kimberly Mine, South Africa, presented by Mr. Chas. Bullock; and two photographs, one of two beech trees which had grown together in several places, and the other of a birch tree, which was 17 feet in circumference, 4 feet from the ground. The trees grew in Sullivan County, Pa., and the photographs were presented by Mr. Chas. H. LaWall.

The first paper, which was on the subject of "Parthenium Hysterophorous," by Dr. H. V. Arny, was read by Professor Trimble (see p. 169). The active principle, or principles, of this plant have heretofore generally been regarded as an alkaloid by investigators. However, an examination of the plant, in 1889 by the author, gave no evidences of an alkaloid, but a substance was isolated which was then believed to be a glucoside. It was, therefore, with a view of clearing up the chemistry of the bitter principle of the plant that the present investigation was undertaken.

The second paper presented was on a "Proximate Analysis of Orris Root," by S. Allen Tucker (see p. 199). This analysis was undertaken for the purpose of ascertaining the effects of solvents on orris root, as it was believed that such knowledge would be found of service in determining the percentage of this root in tooth powders and like preparations. An interesting result of the analysis was the large amount of starch which was 16·85 per cent.

A paper entitled "A Brief Résumé of Acetic Anhydride in Oil Analysis, and a Modification of the Method for Estimating Menthol in Oil of Peppermint" was read by Lyman F. Kebler (see p. 189). The author referred to the difficulties which have attended the examination of essential oils, but said that methods are being established which will render their analysis quite easy. Among other factors to be considered, he emphasized the importance of the boiling point.

Replying to an inquiry in reference to the production of the esters of essential oils, Professor Sadtler referred to a recent report of Schimmel and Co. on this subject, and mentioned some of the compound ethers which are being sold in concentrated form by that firm.




"Some Observations on Acacia of Commerce" was the subject of a contribution by J. Henry Schroeder (see p. 195). The chairman remarked upon the great change in the character of acacia, and said that it did not possess the adhesiveness that it formerly had.

Professor Ryan said that twenty years ago no gum but that of Acacia Senegal was sold, while the present supply is obtained from a variety of sources, and as a result much of it is of inferior quality. He advised care in buying the powdered or granulated gum, and said that he had examined a sample of powder which contained 40 per cent. of starch.

Messrs. Boring and Procter also remarked on the unsatisfactory quality of the drug.

The last paper on the programme was read by Harry Matusow, the subject being "Marrubiin and its Chlorine Derivative" (see p. 201). This paper gave evidence of much careful work on the part of its author, and the importance of the study and classification of the active constituents of various plants cannot be overestimated.

At the close of the consideration of the papers, a lamp, which was presented by Messrs. Eli Lilly & Co., of Indianapolis, Ind., and which is known as the Moffatt Formaldehyde Generator, was exhibited. Professor Trimble described the method of using it, and its general construction is illustrated by the accompanying drawing. The device is recommended for disinfecting purposes, its usefulness in this respect being due to the conversion of methyl alcohol into formaldehyde gas. The amount of gas generated from one pint of alcohol is said to effectually disin-

fect a capacity of 3,000 cubic feet. A photograph of a battery of twelve generators was also exhibited. The generators are all connected with one large reservoir for containing the alcohol, and this form of the apparatus may be used for the disinfection of large spaces.

An expression of thanks was voted Messrs. Eli Lilly & Co. for their present, and those who furnished papers.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
*Registrar.*

## NOTES AND NEWS.

*Wild Garlic.*—Allium vineale is the most injurious weed at the present time in the Middle Atlantic States. From Pennsylvania to South Carolina and Tennessee, it is known to townspeople as disfiguring lawns; to farmers and millers as a pest in wheat, and to dairymen and their customers as ruining dairy products when eaten by cows in the pastures. It is not native in this country, but was introduced at an early date from the Old World. One of the earliest authentic records of its presence in America is contained in Pursh's American Flora, published in 1814, in which it is said to be "in old fields; common."—*Circular No. 9, United States Department of Agriculture, Division of Botany.*

*Sandalwood oil* should not have a specific gravity less than 0·975 at 15°, and it should dissolve in 5 parts of alcohol of 70 per cent. by volume. The following process for its examination has been devised by A. J. Hendrix (*Jour. de Pharm. et de Chim.* [6] **4**, 499): Weigh into a flask of 10 c.c. capacity 2 grammes of a solution of 3 parts crystallized phenol in 1 part of alcohol, add 0·5 gramme of the oil and mix perfectly. Add 0·5 gramme concentrated hydrochloric acid without shaking. At the intersection of the liquids there is formed in pure sandalwood oil a yellow coloration, changing to a bright red in a few minutes. With oil of copaiba the upper quickly becomes mauve-colored. With oil of cedar the upper liquid becomes cloudy, and a brownish color is developed at the intersection.

## OBITUARY.

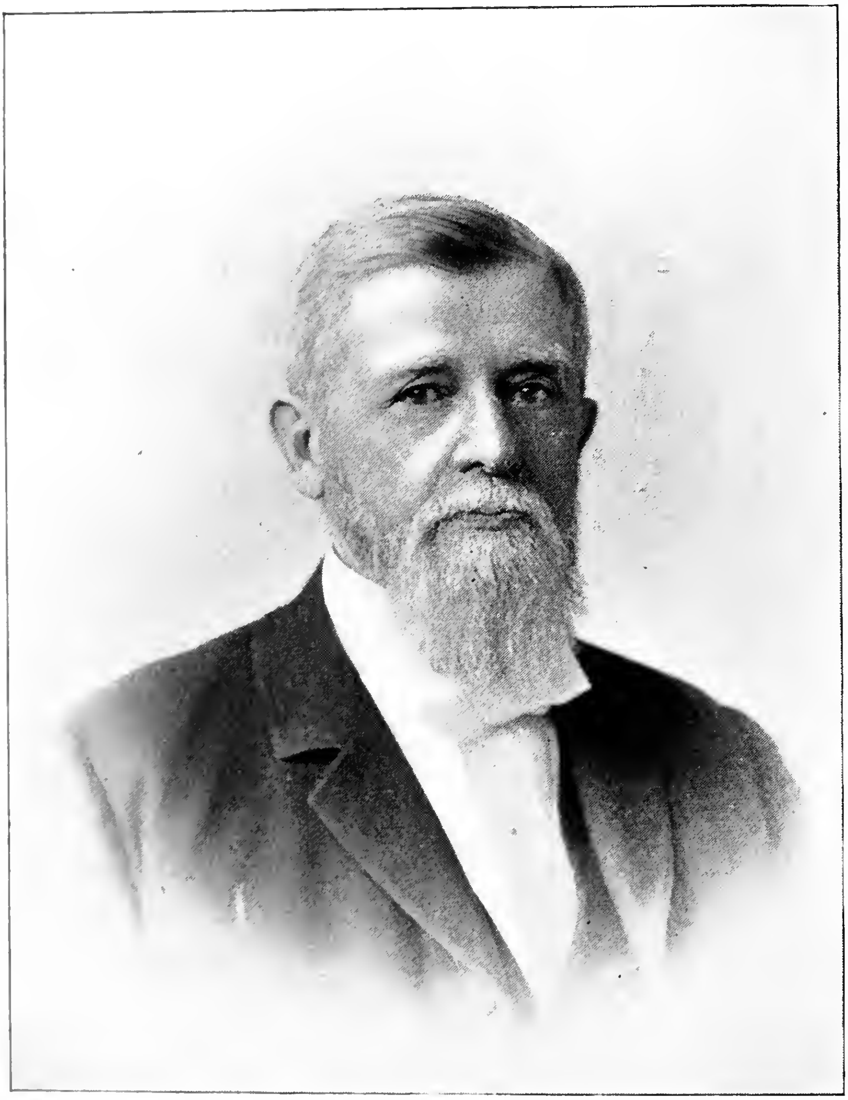
*William Kline Mattern, M.D., Ph.G.*, died suddenly April 16, 1896, at the Coroner's private office, No. 632 Chestnut Street, this city. Death was caused by rupture of the pulmonary artery as a result of blood-poisoning.

Dr. Mattern was in the forty-ninth year of his age, having been born at Hereford, Lehigh County, Pa., August 5, 1847.

He came to this city in 1870, and graduated from the Philadelphia College of Pharmacy in 1874. Since 1886 he had been engaged in the retail drug business at 2602 Germantown Avenue.

After having taken a course at Jefferson Medical College, he received the degree of Doctor of Medicine in 1882. Dr. Mattern was officially connected with the Twenty-eighth Sectional School Board for several years, and, in 1895, was appointed a member of the Board of Education.

In 1892 he received the appointment of Coroner's Physician, which position he had held since that time.



Robt Shoemaker

THE AMERICAN
JOURNAL OF PHARMACY

*MAY, 1897.*

## MEMOIR OF ROBERT SHOEMAKER.

Robert Shoemaker deceased on the 17th day of December, 1896, at his residence, 1736 Green Street, in this city, at the age of 80 years. Notwithstanding the bodily infirmities which attend advanced age, he continued his attention to business until November, when serious illness obliged him to retire. He was the oldest druggist in Philadelphia who continued actively in business up to the time of his decease.

The ancestors of Robert Shoemaker came from Kriegsheim, a village on the right bank of the Rhine, about eight miles from the town of Worms. The family name was Schumacher, anglicized to Shoemaker after their arrival in America.

In 1677 William Penn visited Kriegsheim, attracted by the religous persecution of Dissenters, whose religious views were somewhat in accord with those of the Friends, or Quakers as they were then called.

Penn tendered to them an invitation to join his colony in Pennsylvania. In 1683 a part of the family emigrated, and were followed by others in the next three years. They settled near Philadelphia, in the locality known as Germantown, and their names are associated with the early history of Germantown and the adjacent districts.

Robert Shoemaker was the son of Richard M. and Sarah Shoemaker. His mother's maiden name was Sarah Clever. He was born in Shoemakertown, Montgomery County, Pa., February 2, 1817; his father conducted a country store at that place. His early education was acquired at Abington school, and at the school of Solomon Jones, in Cheltenham township.

In 1831 Robert was apprenticed to William Scattergood, a member of the Society of Friends, to learn the drug business. Many of the prominent apothecaries of this city were, at that period, members of this religious society.

The store of Wm. Scattergood was at the corner of Second and Green Streets, Philadelphia.

The aptitude and ability of the young apprentice was shown by his purchase of the store in 1837, when only twenty years of age.

In 1837 Robert commenced the preparation of the plasters of the U. S. Pharmacopœia. While engaged in the manufacture of plasters, his attention was directed by the late Prof. William Procter to the value of the residuum liquid which had been allowed to run to waste. By his request and advice he prepared for him some glycerine from this waste liquor, which was presented by Prof. Procter as the first glycerine made in this city, if not in America (1846).

Glycerine had not then come into use, medicinally or in the arts, and there was no demand for it. In 1848 the French medical journals called attention to its use in pulmonary complaints. This notice of its use created a demand among the medical profession, and in 1848 Mr. Shoemaker made the first glycerine that was sold in this market; the quantity was small and the price was $4.00 per pound. The entire product sold in 1848 was 15 pounds. As the demand increased, importation of glycerine commenced, and the price fell. In 1849 Mr. Shoemaker made about 200 pounds, the price averaging about $2.70 per pound.[1]

In 1852 his brother, Benjamin H. Shoemaker, was taken into partnership with him. A specialty of the firm was the manufacture of spread plasters, which acquired a high reputation in the trade; they were the first in this city to engage in this specialty. Adhesive plasters, spread on muslin, had been in use many years, but the apothecary had been obliged to spread all other plasters on sheepskin, as the occasion required.

During his apprenticeship Robert Shoemaker was denied the advantages of attending the instruction given by the College of Pharmacy.

The lecture course was in the evenings, generally the most busy time with the apothecary. He was obliged to make good, as far as possible, the loss of this opportunity by self-instruction, and in con-

[1] An interesting paper, by Mr. Shoemaker, on this subject will be found in the American Journal of Pharmacy, June, 1879.

sequence was not a graduate of the College, a circumstance which he often spoke of with regret.

After entering into business on his own account, he became a member of the College, and was made a member of its Board of Trustees March 27, 1843, and first vice-president 1869, continuing in that office up to the time of his death. In 1894 the degree of Master in Pharmacy was conferred upon him by the College.

After conducting business for nearly twenty years at Second and Green Streets, the firm removed, in 1856, to Fourth and Race Streets, and greatly enlarged their business.

In 1864 two sons of Robert, Wm. M. and Richard M., were taken into partnership. In January, 1866, Benjamin H. Shoemaker withdrew from the firm, and, taking an adjoining store, gave his attention exclusively to plate and window glass, a branch of the business whith had grown to such large proportions as to make its separation from the drug business of the firm desirable. The firm now consists of Richard M., Thomas E. and Benjamin H. Shoemaker, Jr.

His experience in business convinced Robert Shoemaker of the advantage to be derived from a meeting of those engaged in the wholesale drug and manufacturing business, and on January 22, 1861, he signed the call for such a meeting, which eventuated in the founding of the Drug Exchange of Philadelphia.

He was president of this body from 1867 to 1870, and in 1890 was made an honorary member, in recognition of his valuable services.

He was one of the incorporators of the Consolidation Bank, and one of its directors from the time of its founding.

For many years he was a member of the Fire Insurance Association of Philadelphia, and of the Delaware Mutual Fire Insurance Company.

After the failure of Jay Cooke, in 1873, he was appointed one of the trustees for the settlement of their affairs.

He took great interest in public school education, was a director in the Cheltenham District, Montgomery County, for over fifteen years, giving active service in every detail pertaining to the welfare of the scholars and teachers, the school at Shoemakertown being named after him.

Robert Shoemaker was married to Elizabeth Moore, daughter of the Rev. William Moore, of Philadelphia, November 25, 1837.

She died February 26, 1857, leaving the following children: William M., Richard M., Sarah C., Joseph M., Thomas E. and Benjamin H. Shoemaker, Jr.

He was again married to Ann Summers, of Alexandria, Va., to whom were born the following children: James, Roberta, Mary and Ellis C. Shoemaker, and who survive him.

Robert Shoemaker was a representative man in the drug trade of Philadelphia; conservative, yet progressive, he conducted business for sixty years with skill and good judgment, and with a conscientious regard to its close connection with the public welfare.

The sharp competition in trade in his latter years did not disturb his broad views of honorable business methods.

The benefit of his long experience and good judgment was often sought for by younger men, and the kindly manner in which he received such applicants gained for him their confidence and respect.

As a member of the Episcopal Church, he took an active interest in the congregation of St. Paul's Church, Chelten Hills, near which he resided for many years. For a long time he was accounting warden of the church, and continued as such up to the time of his death. In the ground adjoining this church his mortal remains were consigned to rest.

A life extending to four score years may not be marked by great events; but measured by the quiet and steady pursuit of duties well performed, and with a just regard of the interests of his fellow-men, and continuing to the end of his sojourn here, erects a monument to his memory in the esteem and affection of all who knew him.

C. B.

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## GELSEMIC ACID.

By Virgil Coblentz.

The following notes are intended to serve as a preliminary notice concerning investigations on the above subject, which have been carried on at intervals for some years.

The subject was taken up at the suggestion of Professor Lloyd, who also kindly supplied the author with about 50 grammes of an unusually fine crystalline sample of undoubted purity.

This principle was first isolated by Professor Maisch in 1869, named and fully described by Professor Wormley in 1870. Professor Wormley, in his investigation, simply restricted himself to applying various

color tests for the purpose of identifying the principle from the standpoint of a toxicologist.

Dr. Chas. Robbins, in his work on "Ueber die wesentlichen Bestandtheile von Gelsemium sempervirens" (1876), published analyses and claimed that this so-called gelsemic acid of Wormley was not a distinctive new principle, but simply æsculin. This assumption was later contradicted by Wormley (AM. JOUR. PHAR., 1872).

At present, attention will be directed to Dr. Robbins' analyses of this substance, but two having been made, the results being as follows:

| | |
|---|---|
| (I) C = 52·04 per cent. | H = 5·189 per cent. |
| (II) C = 51·82 " | H = 4·98 " |

Dr. Robbins carried on his combustions in a simple bayonet tube with copper oxide, as was customary at that time. This being the case, the author questions the value of the analyses and formula deducted therefrom, even though the figures correspond within a reasonably close limit.

Gelsemic acid is one of those few organic substances which, upon heating with copper oxide or any oxidizing agent, gives up only a portion of its carbon as carbonic oxide, the rest separating as a graphitic-like deposit on the sides of the combustion-tube, which cannot be removed even at the highest possible temperature. Some twenty combustions of gelsemic acid were made after various methods; in several instances two of these corresponded closely, but subsequent results did not justify that any reliance should be placed upon them. The various methods employed were: first, combustion with copper oxide in a bayonet tube; second, with copper oxide in an open tube with a current of oxygen; in the third method of combustion, lead chromate was employed; the fourth method attempted consisted in mixing the gelsemic acid with powdered fused potassium bichromate in a platinum boat, and then burning in an open tube with copper oxide in a current of oxygen.

In each of the above cases every possible device was attempted to avoid the separation of carbon in the tube, but without success. Finally, the well-known method of wet combustion with a mixture of chromic anhydride and sulphuric acid was attempted, a number

of analyses being made with no better success than before. A description of this latter method with apparatus is given here, since it has answered admirably in the analyses of various derivatives of gelsemic acid.

In the combination flask (*Fig. 1*) from 10 to 20 grammes of chromic anhydride are introduced, followed by the gelsemic acid which has been accurately weighed off in a small thin glass tube, this is placed in a nearly upright position in the flask, in order to avoid contact with the $CrO_3$ before the proper time. After securing all the joints of the apparatus, a slow current of pure oxygen gas is passed through the entire apparatus until practically all of the air has been removed, after which the current is regulated to about 20

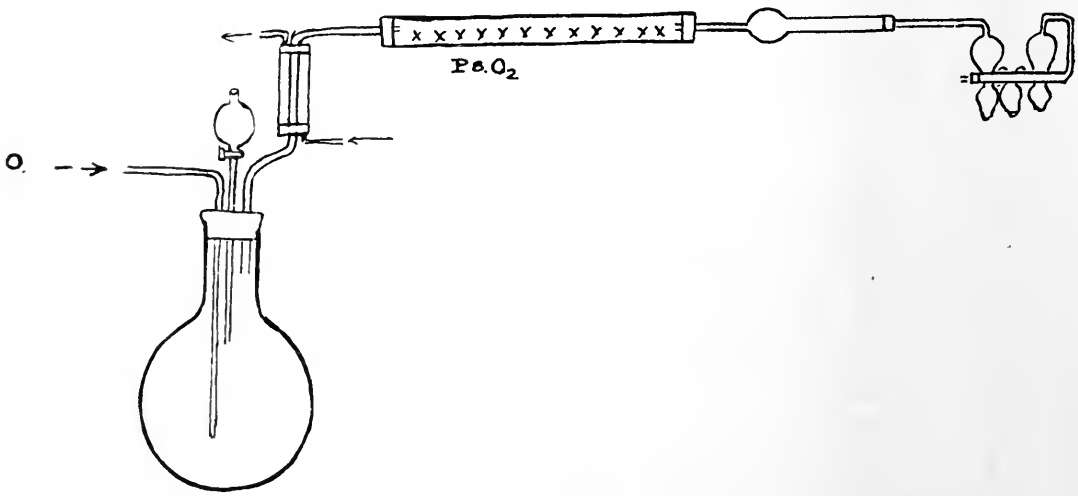


FIG. 1.

bubbles a minute, which is continued throughout the entire combustion, unless the reaction becomes violent, when the current should be temporarily closed. By slightly shaking the flask the gelsemic acid is caused to spill out, and is distributed through the chromic oxide, then the concentrated sulphuric acid which is contained in the separation funnel is allowed to trickle over the mixture very slowly, regulating the flow according to the energy of the reaction. Finally, when the reaction is over, sufficient acid is added to make a bulk of about 20 to 30 c.c. The flask and contents are then cautiously heated, increasing gradually till just short of boiling temperature, which is kept up for a period of fifteen to twenty minutes. The gases given off pass up through a well-cooled condenser into a tube which is filled with spun glass, well covered with lead peroxide,

which serves to retain any sulphur dioxide which is carried over with the mixed oxygen and carbonic oxide. After passing this tube, and before the latter is absorbed by the potash bulb, the gases are dried by passing through two calcium chloride tubes. It is scarcely necessary to note that in carrying out an analysis by this method, the greatest of care must be exercised in regulating the current to as slow a degree as possible. The analysis of acetyl and bromo derivatives of gelsemic acid by this method gave very close concordant results, whereas, as already mentioned, no reliable data could be obtained from the mother substance, owing to the fact that a small portion of the carbon escapes combustion.

The complete analyses of the acetyl and brom gelsemic acid are not given here, as the author desires to complete some molecular weight determinations before assigning a definite formula. In this connection attention is called to the differences in the melting-points of gelsemic acid, and some of its derivations, and the same of æsculin:

| | |
|---|---|
| Melting-point of gelsemic acid is between | 206 and 205·5° C. |
| " " æsculin is | 160° C. |
| " " acetyl gels. acid is | 180° C. |
| " " " æsculin is | 130° C. |
| " " bromo gels. acid is | 250° C. |
| " " " æsculin is | 193–195° C. |

Gelsemic acid readily neutralizes solutions of sodium and potassium hydrate, but fails to yield any definite crystalline salts. Various attempts were made to prepare salts with barium and magnesium with no success.

Attention is here directed to a peculiarity of the potassium gelsemium mixture, which, upon heating or igniting, becomes very voluminous, exhibiting the same phenomena as the "Pharoah's Serpent," which results on heating the sulphocyanate of mercury.

From the various data obtained in the course of my investigations, I hope, at a near future date, to be able to shed some light upon the constitution of this interesting substance, as well as to prove my surmise that gelsemic acid is a principle distinct from æsculin.

NEW YORK, April 20, 1897.

# CONSIDERATION OF SOME RECENT SUGGESTIONS CONCERNING OINTMENT OF MERCURIC NITRATE.

BY CHARLES H. LA WALL.

The *Pharmaceutical Journal*, of February 27, 1897, page 172, contained an article by P. W. Squire, upon the processes now official for the preparation of ointment of mercuric nitrate, commonly called citrine ointment.

Mr. Squire's experiments were mainly devoted to the consideration of the differences now existing between the quantities and manipulations directed by the U.S.P. and B.P.

While he slightly favored the use of a combination of lard and olive oil (as is authorized in the B.P.) instead of lard oil (directed by the U.S.P.), Mr. Squire acknowledged the superiority of our process in previously acting on the fatty base with a portion of the nitric acid, instead of adding the mercury dissolved in the whole quantity of nitric acid, as the B.P. directs. His observations on the variations produced by the influence of different temperatures show the necessity of guarding against over-heating the compound after the addition of the mercuric nitrate solution.

In commenting upon Mr. Squire's paper in the last number of The AMERICAN JOURNAL OF PHARMACY (Vol 69, p. 209), Mr. J. W. England suggests some improvements on the present officinal process, which are offered for trial and discussion.

Mr. England's improvements consist in (1) using a proportionate amount of red oxide of mercury in place of the metal; (2) changing the temperature to which the mixture should be permitted to cool before adding the mercuric nitrate solution; (3) incorporating about 5 per cent. of glycerin with the finished product when nearly cold.

The reasons given for the substitution of red mercuric oxide for metallic mercury are: (1) because small quantities of the oxide are more easily weighed; and (2) because the oxide is *probably* purer than the commercial mercury.

There are altogether six official preparations in which metallic mercury is directed by the U.S.P., so that a certain amount of dexterity ought to be acquired in the weighing of this elusive substance by a pharmacist who does his own manufacturing. As to

the relative purity of the two substances, the experience of a large manufacturing establishment shows that the commercial metallic mercury is of far greater uniformity and purity than the "red oxide" of commerce. Many samples of the red mercuric oxide have been encountered, which yielded a brownish colored nitric acid solution and left an insoluble residue resembling brick-dust; so that it would be better to use the metallic mercury in the preparation of the official solution of mercuric nitrate, in order to ensure a satisfactory product. The purity of commercial mercury was, in all cases noticed, very good; in purifying 156 pounds only ¾ pound of impurity was obtained, or less than ½ per cent. The use of the red oxide of mercury was suggested first in 1862[1], and more recently in 1886, by R. Rother, who "finds advantages in the use of mercuric oxide" without explaining what these advantages are.

The suggestion as regards temperature is one of great importance, as experience has shown in the manufacture of a total of hundreds of pounds by the process outlined in the AMERICAN JOURNAL OF PHARMACY, 1894, p. 523, that careful observance and control of temperature is essential for the production of a satisfactory product. The directions might be supplemented by advising the maintenance of the temperature at 60° C. until all reaction ceases, in order to obviate the development of the spongy condition so often noticed in this product.

The addition of glycerin may be advantageous in some respects, but in the formula as proposed by Mr. England, the addition of 50 grammes of glycerin to 1,000 grammes of ointment of officinal strength, reduces the percentage of mercuric nitrate below that required by the U.S.P.; this, however, could be easily remedied by diminishing the quantity of lard oil by 50 grammes.

It is well for those who have difficulty with officinal processes to suggest improvements for the same; but in the case of citrine ointment, it is extremely likely that those who fail to produce a satisfactory preparation by the U.S.P. process would not succeed with any method.

A final consideration, not to be altogether ignored, is the raising of the cost of manufacture of the preparation, which would happen

[1] AM. JOUR. PHAR., 34, p. 394.

were the oxide of mercury used in place of the metal. Calculations show that the finished product would cost about one and one-sixth times as much as it does by the present process.

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## GELSEMIUM.

### ANALYSIS OF ROOT, RHIZOME AND STEM.

BY L. E. SAYRE.

In the January issue of this journal, attention was called to the fact that in the commercial drug gelsemium, which should consist of rhizome and root, were frequently found portions of the stem in varying proportions. It was stated on the authority of Gerald McCarthy, botanist of the North Carolina Agricultural Experiment Station, that the stem was apparently collected and used to adulterate the drug.

It was further stated that the stem probably had no medicinal value, but of this no definite statement could be made until an analysis, then in progress, was completed. Mr. W. V. Ingham, a pharmacy student of the University of Kansas, has made this analysis, and also made a comparison of the active constituents in the three parts of the plant mentioned.

Since the time above referred to, gelsemium root has been obtained from different quarters, with a view of ascertaining the quality of the market's supply. As a result, it is safe to state that there is no difficulty in obtaining a drug free from stem from houses having an established reputation as dealers in crude drugs. The article supplied from several quarters was remarkably free from fragments of stem.

For analytical purposes a supply of the stem was obtained, not only from the commercial drug, but from a living plant of six years' growth, cultivated in a nursery.

Mr. Ingham, in order to perfect himself in the work, made a number of trial analyses of reliable powders of gelsemium, and thoroughly studied the process of isolation and quantitative determination of the active constituents.

The report of his analysis is briefly stated as follows :

| Constituents. | Ingredient Percentage in Rhizome. | Ingredient Percentage in Root. | Ingredient Percentage in Stem. |
|---|---|---|---|
| Moisture | 3·2 | 3· | 3·8 |
| Volatile oil | 0·5 | 0·4 | Trace. |
| Fixed oil | 5·6 | 7·4 | 3·2 |
| Resins | 4·4 | 2·4 | 3·8 |
| Gums | 0·8 | 0·7 | 1·1 |
| Gelsemine alkaloid | 0·2 | 0·17 | — |
| Gelsemic acid | 0·37 | 0·3 | — |
| Starch | 6·8 | 7·6 | 6·3 |
| Ash | 2 6 | 2·2 | 2·7 |
| Other organic acids | 2·7 | 2·8 | 1·9 |
| | 27·17 | 26·97 | 22·8 |
| Inert material, cellulose, etc. | 72 83 | 73·03 | 77·2 |
| Total | 100· | 100· | 100· |

Dragendorff's method was followed except in the case of the gelsemine and gelsemic acid, where a modified method was used. (See p. 332, Blyth, "Poisons; Effects and Detection," 1884.)

The gelsemic acid was obtained in transparent needle-shaped crystals. The alkaloid was obtained only in the amorphous state, and in that state estimated.

It would seem from the above analysis that the principles upon which the drug depends for its activity are absent or present only in small quantities in the stem, so that the admixture of any appreciable amount of stem must correspondingly reduce the value of the drug as a medicine.

## THE STRUCTURE OF LEPTANDRA.

By A. P. Breithaupt, Ph.G.

Contribution from the Botanical Laboratory of the Philadelphia College of Pharmacy.

The official Leptandra consists of the rhizome and roots of Veronica virginica, Linne, belonging to the natural order Scrophulariaceæ, growing throughout the United States east of the Mississippi, being found in mountainous meadows in the South and rich woods in the North.

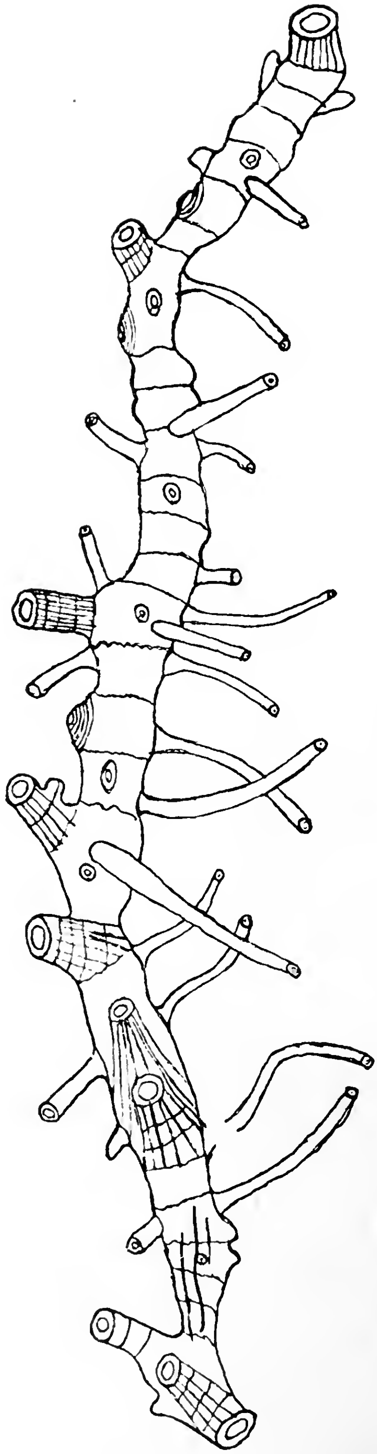

*Fig. 1.* Rhizome and roots of Veronica virginica, L., natural size.

The plant is an herbaceous perennial, having a simple, erect stem, from 2 to 6 feet high, bearing leaves in whorls, and terminated by a long-panicled spike of whitish flowers.

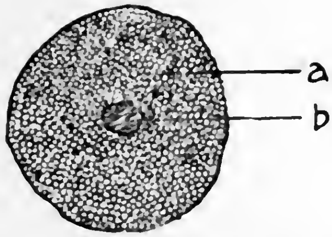


*Fig. 2.* Cross-section of the root, magnified 10 diameters; *a*, cortex; *b*, central cylinder.

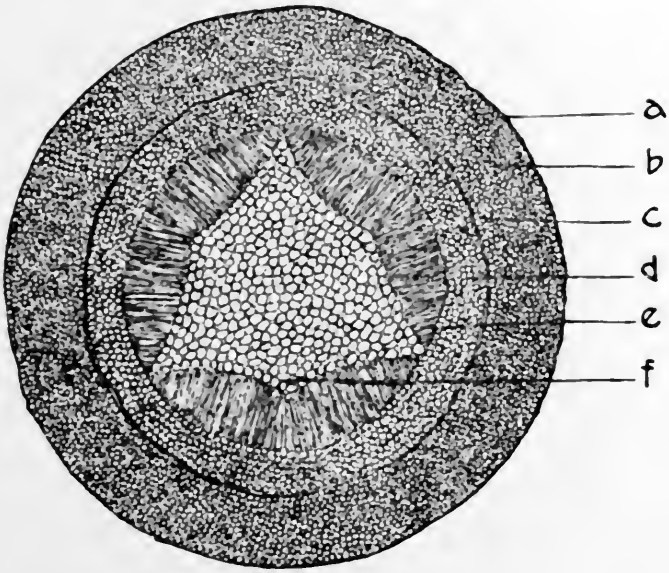


*Fig. 3.* Cross-section (*a*) of rhizome, magnified 10 diameters; *a*, outer layer of bark; *b*, middle layer of bark; *c*, interrupted circle of sclerenchyma fibres; *d*, inner layer of bark; *e*, wood; *f*, pith.

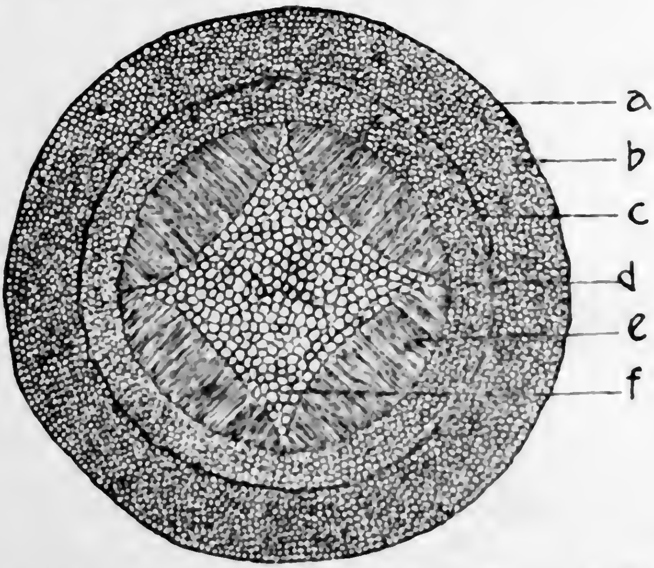


*Fig. 4.* Cross-section (*b*) of rhizome, magnified 10 diameters; *a*, outer layer of bark; *b*, middle layer of bark; *c*, interrupted circle of sclerenchyma fibres; *d*, inner layer of bark; *e*, wood; *f*, pith.

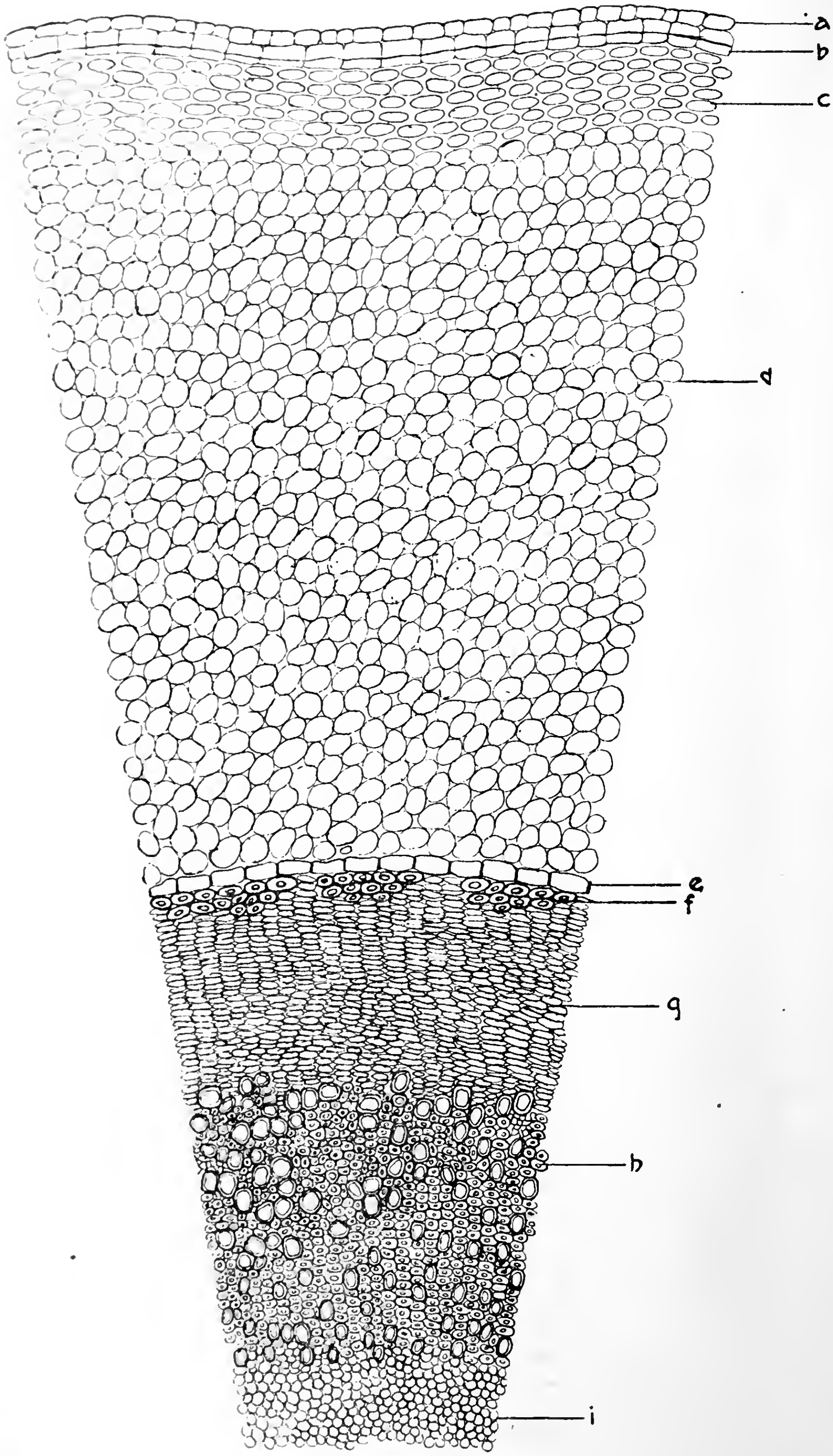


*Fig. 5.* Cross-section of rhizome, magnified 500 diameters; *a*, epidermis; *b*, cork or periderm; *c*, hypoderma of collenchyma; *d*, cortical parenchyma; *e*, endodermis; *f*, sclerenchymatous pericycle; *g*, phlœm or bast; *h*, xylem or wood; *i*, parenchyma of pith.

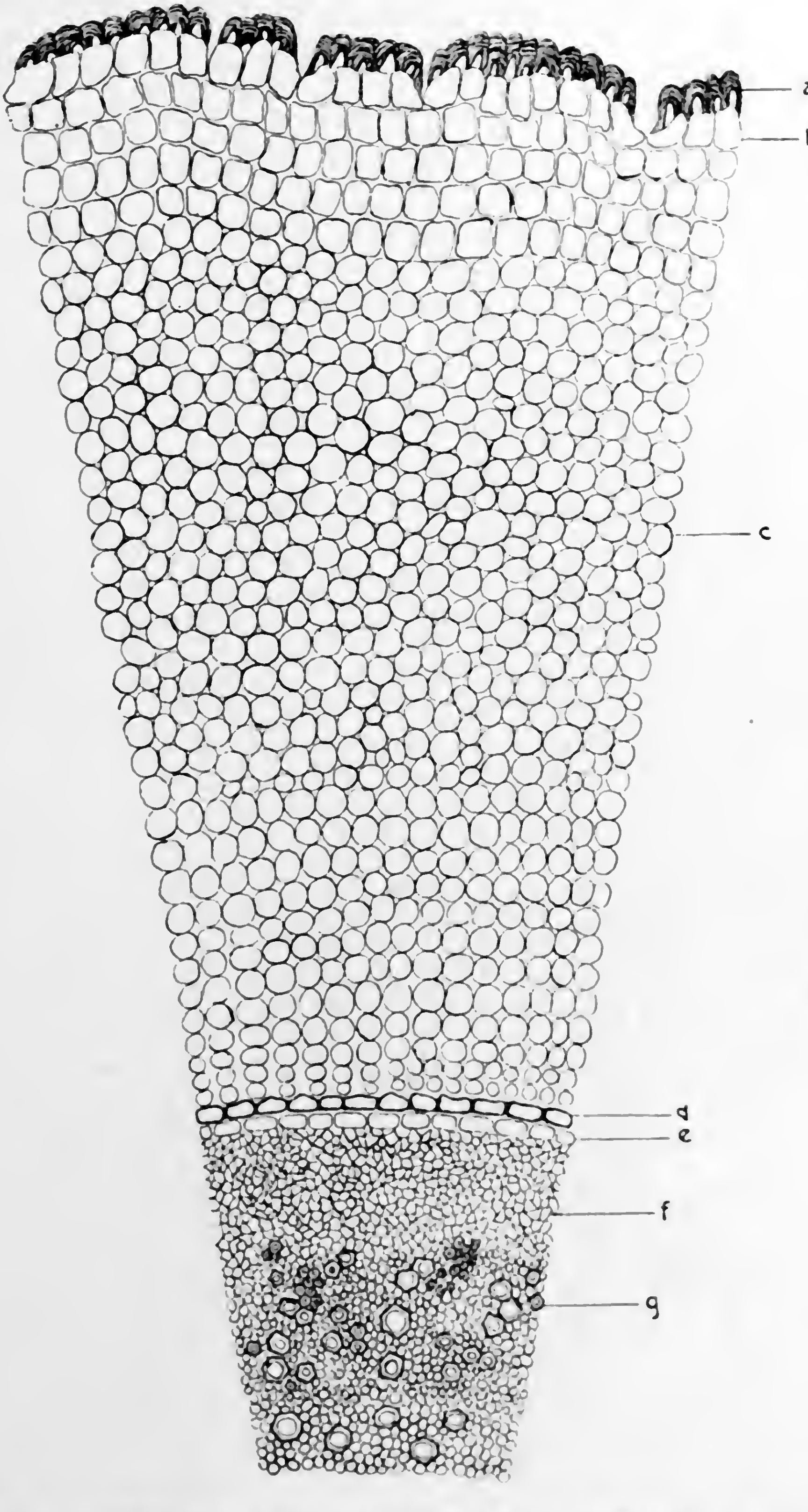


*Fig. 6.* Cross-section of the root, magnified 500 diameters; *a*, epiblema or epidermis of the root; *b*, exodermis or hypoderma of the root; *c*, cortical parenchyma; *d*, endodermis; *e*, parenchymatous pericycle; *f*, phlœm of the vasal bundles; *g*, xylem of the vasal bundles.

The leaves, from four to seven in each whorl, are short-petioled, lanceolate and minutely serrate.

The flowers are small and white, having a four-parted calyx and a tubular corolla, with two exserted stamens.

The fruit is an ovate, two-celled and many-seeded capsule.

The plant flowers in July and August.

The rhizome, from 4 to 6 inches in length and ¼ inch in thickness, is horizontal, somewhat bent and branched with short-stem remnants or cup-shaped scars on the upper side, and beset with numerous long, straight and brittle rootlets. The rhizome is hard and breaks with a woody fracture, is almost inodorous, and has a bitter and feebly acrid taste. Internally it shows a blackish bark, and a hard, yellowish circle of wood enclosing a three- to six-rayed purplish pith.

The roots, which may be several inches in length, are about ½ inch in diameter, somewhat longitudinally wrinkled, purplish-brown, and break with a short fracture.

A transverse section of the rhizome shows a relatively thick bark, consisting of ordinary parenchyma, covered by a hypoderma of collenchyma and a thin cork, the whole being enclosed by a persistent epidermis. The inner layer of the bark shows a distinct endodermis, beneath which is found an interrupted circle of lignified fibres, constituting a sclerenchymatous pericycle. The wood is disposed in a single circle, and consists of ducts and lignified fibres arranged in more or less distinct radial rows. The pith is large, from three- to six-rayed, consisting of ordinary parenchyma.

A cross-section of the root shows a very thick cortex, sharply marked off from the woody cylinder by a distinct endodermis. The cortical tissues consist of ordinary parenchyma covered by a strongly cutinized epidermis, beneath which is seen a single layer of exodermal cells. Immediately beneath the endodermis is found a single-layered parenchymatous pericycle which encloses the wood bundles.

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## LIQUOR POTASSÆ AND LIQUOR SODÆ.

By John P. Bates, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 164.

According to the United States Pharmacopœia, liquor potassæ is "an aqueous solution of potassium hydrate [$KOH=55·99$], contain-

ing about 5 per cent. of the hydrate." The same authority describes it as "a clear, colorless liquid, odorless; having a very acrid and caustic taste, and a strongly alkaline reaction."

"To neutralize 28 grammes of solution of potassa should require about 25 c.c. of normal sulphuric acid (each c.c. of the volumetric solution indicating 0·2 per cent. of absolute potassium hydrate), phenolphthalein being used as indicator."

The Pharmacopœia also says: "Solution of potassa should be kept in bottles made of green glass, and provided with glass stoppers, coated with paraffin or petrolatum." Desiring to ascertain the strength and purity of the preparation, as dispensed by wholesale and retail drug firms, six samples were procured and examined, two being purchased from the former and four from the latter; all of the houses were in Philadelphia.

Samples 2, 3 and 5 were colorless, while 1, 4 and 6 had straw colors. Sample 4 was translucent; all the other samples were clear. All contained insoluble foreign matter except sample 2.

All of the samples were odorless and decidedly alkaline to litmus paper. All gave a violet color to the non-luminous flame. Two pharmacists took the precaution to dispense the solution in colored glass bottles, and labelled poison.

The writer also examined the samples for potassium, by acidifying the solution with acetic acid and adding sodium cobaltic nitrite. All of the solutions showed this base. Number 3 showed a small amount of calcium, when some of it was acidulated with acetic acid and mixed with ammonium oxalate; the other samples were free from it. Carbonate was found in samples 1, 2, 3 and 5.

By titrating with decinormal sulphuric acid volumetric solution, the samples were found to contain, respectively, 3·18, 8·74, 4·10, 3·74, ·018 and 4·38 per cent. of absolute potassium hydrate.

Attention is directed to sample No. 5, which showed about ·018 per cent. of potassium hydrate as calculated from the acid used. But in view of the fact that the sample showed much carbonate, it is likely that the solution owed its alkalinity almost entirely, if not altogether, to potassium carbonate.

Liquor sodæ, or solution of soda, should be, in order to comply with the requirements of the United States Pharmacopœia "an aqueous solution of sodium hydrate ($NaOH = 39{\cdot}96$), containing about 5 per cent. of the hydrate." The Pharmacopœia also desig-

nates it as "a clear, colorless liquid, odorless, having a very acrid and caustic taste, and a strongly alkaline reaction." "To neutralize 20 grammes of solution of soda should require about 25 c.c. of normal sulphuric acid (each c.c. of the volumetric solution indicating 0·2 per cent. of absolute sodium hydrate), phenolphthalein being used as indicator."

The Pharmacopœia recommends the solution to be dispensed in the manner ordered for liquor potassæ. In order to determine the exact quality of the article as sold by manufacturing pharmacists, six samples were purchased and examined. Four of these were obtained at retail stores and two at wholesale houses. When the samples were subjected to the flame test for sodium, samples 1, 3 and 6 gave evidence of potassium. These behaviors were afterwards confirmed by means of the sodium cobaltic nitrite test. Sample 3 was translucent, the other samples were clear. Samples 1, 3 and 4 had straw or yellow colors; the others were colorless. Sample 3 was the only one containing insoluble foreign matter. All were odorless and strongly alkaline to litmus paper. No. 3 contained calcium. Carbonate was present in samples 1, 2, 3 and 5. Three pharmacists dispensed the samples in colored vials. Two of these vials bore poison labels.

Upon titrating the samples with decinormal sulphuric acid volumetric solution, they were found to range from one-half to twice the official strength, as follows:

10·00, 4·47, 2·31, 5·25, 4·21 and 4·93 per cent.

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## VALUATION OF LIQUOR IODI COMPOSITUS.

By Richard Hal Compton, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 165.

Lugol's solution is required by the United States Pharmacopœia to be a 5 per cent. solution of iodine, dissolved in water by the addition of 10 per cent. of potassium iodide. The same authority directs that if "12·66 grammes of the solution be mixed with a few drops of starch test solution, it should require for complete decoloration from 49·3 c.c. to 50 c.c. of sodium hyposulphite decinormal volumetric solution (each cubic centimeter of the volumetric solution corresponding to 0·1 per cent. of iodine)."

Being desirous of knowing to what degree the retail dispensers were governed by the Pharmacopœial requirements for liquor iodi compositus, I obtained a few samples at different pharmacies and estimated the per cent. of iodine by the official method. The results of my titrations indicated the following percentages for the samples: 4·96, 4·82, 4·72 and 4·17.

As there is no test given under Lugol's solution for estimating the potassium iodide present, I have made some experiments for the purpose of devising one. The following was found to be the best of several methods tried, and can be recommended on the concordant results which it furnished:

Take a definite amount (12·66 grammes) of the solution and titrate it according to the official method of estimating the iodine. The amount of the latter is thus obtained. Now titrate the residual liquid with decinormal silver nitrate volumetric solution, using potassium chromate as an indicator if desired, until all of the iodides which the solution contains have reacted with the silver nitrate and formed insoluble silver iodide.

The iodides of the solution consist of the potassium iodide originally present and the sodium iodide produced in the reaction between the sodium thiosulphate and the free iodine of the sample. The volume of the solution of sodium hyposulphite is the measure of the free iodine of the sample, and therefore the equivalent of the volume of silver nitrate required to react with the sodium iodide which it forms. Hence, if the volume of sodium hyposulphite required to decolorize the iodine of the sample be deducted from the volume of silver nitrate required to completely precipitate the decolorized liquid, the remainder will be the volume of decinormal silver nitrate volumetric solution required for the potassium iodide that was present. Multiply the number of cubic centimeters so found by 0·016556, the value of 1 c.c. of the silver nitrate solution in potassium iodide, to find the amount of potassium iodide. Then by proportion calculate the percentage amount of it.

It was also found that practical results could be gotten by boiling the Lugol's solution after dilution with water until all the free iodine was expelled, and then titrating with standard silver nitrate solution, which indicated at once the amount of potassium iodide present.

# THE PRESENCE OF STARCH AND STRONTIUM SULPHATE IN OPIUM AND THEIR INFLUENCE ON ASSAYING.

By Lyman F. Kebler and Charles H. LaWall.

Although poppy juice does not contain any starchy matter, yet the presence of this article in opium has been reported in a number of instances. According to the Pharmacographia, p. 47, Egyptian opium sometimes contains an abundance of starch. Mr. Mjöen,[1] who has probably made the most exhaustive microscopic study of opium on record, reports that Persian opium is abundantly contaminated with wheat and leguminous starch. More recently Mr. Jelliffe,[2] in a report at the regular meeting of the New York College of Pharmacy, stated that from 5 to 10 per cent. of starch was found in the samples examined.

We ourselves have found wheat starch in opium assayed during the past two years. Mr. Moerk kindly sent us six samples of opium from three to five or six years old and every one contained wheat starch. The amount varied from a trace to 8 per cent., but it was always present. Why the starch is there and how it came to be there we can only surmise. In some cases it may have been added for gain, but from the small quantity present in some samples its presence may be accidental. Persian opium is exported to Constantinople, by way of Trebizond, and is there worked up into forms to imitate the Asia Minor opium. Here is probably the source of contamination with starch, since Persian opium contains much of this.

Before leaving the question of starch, a few words about its estimation in this connection may not be out of place. There are two ways of arriving at approximate results—microscopically and chemically. The one is probably as accurate as the other.

Microscopically, dry the opium, note moisture and reduce to a fine powder. Weigh out 1 gramme of the powder, introduce it into a mortar containing 2 c.c. of alcohol; with a pestle rub up the opium well, add 8 c.c. of simple syrup and mix intimately. Of this mixture prepare a slide and by means of an ocular micrometer, divided into square millimeters, count the number of granules in a

[1] 1895, *Arch. d. Pharm.*, 233, 533.

[2] 1897, *Am. Drug.*, 30, 41.

square of 100 square millimeters. Should any worker be without a micrometer, the total number of granules in a field may be counted. Repeat the counting with successive drops three or four times, and take the average of the several countings. Having approximated the number of starch granules in the above mixture, prepare a syrupy mixture of the same starch as that contained in the opium, say a 1 per cent. mixture, and determine the number of starch granules as above. If the number of starch granules is greater or less than those contained in the opium mixture, dilute the mixture or make a more concentrated one, as the case in hand requires. If the number of granules is the same in both mixtures, the per cent. of adulterant is readily calculated.

When more than one kind of starch is present, the per cent. of adulterant is more difficult to determine.

*Fig. 1.* Epidermis of capsule, magnified 500 diameters.

Chemically, the starch can be estimated as follows: Exhaust 10 grammes of the opium with cold water, place the residue into a flask, add 200 c.c. of alcohol containing 5 per cent. of potassium hydroxide, and boil vigorously on the water bath for about fifteen minutes. Filter while hot and wash the residue with hot alcohol, until the filtrate is nearly colorless. Dissipate the alcohol from the residue and introduce the latter into a suitable flask, add 200 c.c. of water, 16 c.c. of hydrochloric acid (specific gravity 1·16), attach to a reflux condenser and boil gently for three hours. Cool the contents of the flask, neutralize with sodium carbonate, filter and make up to a definite volume. In this estimate the reducing sugar by Fehling's solution, either volumetrically or gravimetrically. The weight of reducing sugar multiplied by 0·9 equals the amount of starch contained in 10 grammes of opium.

By this process there is estimated as starch, the pentosans and other carbohydrate bodies, which will undergo hydrolysis when boiled with hydrochloric acid. We have reasons for thinking that starch estimations made in plant analysis by means of hydrochloric acid are frequently wide from the truth.

*Fig. 2.* Epidermal tissue of leaf, magnified 500 diameters.

Let us now turn our attention to the general microscopical appearance of the opium. On clarifying some opium with chloral hydrate the structure of the pericarp of the poppy was clearly brought out, as shown in *Fig. 1*. In the same clarified material were found scalariform and spiral vessels. An abundance of calcium

*Fig. 3.* Wheat starch granules, magnified 500 diameters.

oxalate crystals and some wheat brand were found in several cases. Leafy epidermal tissue was also abundant on every slide, *Fig. 2.* The starch was brought out by the usual iodine reaction, *Fig. 3.*

All these substances that do not increase the yield of morphine, by our present methods of assay, must, in our opinion, be considered

of minor importance, so long as it is only required of opium to contain a certain amount of morphine. Substances that do increase the yield of morphine are the ones that annoy the analyst.

About a year ago[1] one of us (K.) called attention to the fact that the amount of impurity associated with the crystallized morphine, as obtained by the U.S.P. process, was abnormally great. The situation has not changed for the better, at this writing. During the past few months some of the opium assayed, yielded unusually high results. The perplexing part in some cases was the fact that one duplicate contained a much larger amount of impurity associated with the morphine than that of the other duplicate. The amount of impurity was estimated by the ash method. This, of course, indicated that some inorganic substance or substances were influencing the results. The ash was repeatedly examined, and in every case strontium was indicated.

*Fig. 4.* Crystals from alcohol-ether precipitate, magnified 500 diameters.

It has frequently been observed, and commented on,[2] that when the 10 grammes of alcohol are added to the 20 grammes of opium extractive, a turbidity frequently results. We now extracted 40 grammes of opium, preparatory to making a 40-gramme, instead of the usual 10-gramme, assay. The customary proportions of alcohol and ether were added and the assay allowed to stand over night. In the morning, it was found that 1·6 per cent. of material had precipitated out. On igniting this precipitate, 19·3 per cent. was volatilized. The residue consisted of strontium, *Fig. 4*, calcium and

[1] 1896, AM. J. PHARM., **68**, 257.

[2] 1895, *J. Soc. Chem. Ind.*, **14**, 464.

potassium sulphates. Since no effervescing was produced when the ash was treated with acid, there was probably no calcium meconate present in the original precipitate.

Several experiments were now undertaken to ascertain the cause of the variation of the amount of impurity contained in the crystallized morphine. One case was sampled twice, by two persons, each using different lumps. These samples were assayed in the usual manner with the following results; average of duplicates:

| | Morphine, Crude. | Morphine, Pure. | Moisture. | Crude Morphine in Dry Opium. | Pure Morphine in Dry Opium. |
|---|---|---|---|---|---|
| Sample 1 . . . | 11·48 | 10·68 | 22·68 | 14·86 | 13·81 |
| Sample 2 . . . | 10·83 | 10·43 | 19·52 | 13·48 | 12·97 |

The variation in the crude morphine is chiefly due to the impurity present, as is clearly shown from the fairly uniform results obtained for the pure morphine.

These same samples were now assayed by both of us, varying the conditions of precipitation, such as temperature, time of shaking, etc., with results as follows:

| | | Crude Morphine. | Pure Morphine. | Moisture. | Crude Morphine in Dry Opium. |
|---|---|---|---|---|---|
| Sample 1 . . | L. | 11·48 | 10·68 | 22·68 | 14·86 |
| | L. | 11·56 | 10·81 | 22·68 | 14·96 |
| | K. | 10·94 | 10 58 | 22·68 | 14·16 |
| Sample 2 . . | K. | 10·96 | 10·58 | 19·52 | 13·63 |
| | K. | 10·90 | 10·35 | 19·52 | 13·54 |
| | L. | 10·84 | 10·43 | 19·52 | 13·48 |

The above results are average of duplicates. They show that ordinary variations in assaying influence the results very little, when referred to pure morphine. The greatest variations appear to be due to the sampling, and to the impurity associated with the morphine as obtained by the U.S.P., method of assay. The impurity contained in the crude morphine was estimated by the ash method. This method probably gives higher results than any other, and is perhaps the best, considering the present impurities in opium.

In order to ascertain whether or no we had unconsciously lapsed into a trend, Dr. Squibb's chemist, Mr. Smith, kindly checked our work, and with his permission we append his results below in connection with our own. Mr. Smith employed Dr. Squibb's process as outlined in the Ephemeris, 3, p. 1152, and the U.S.P. method with the lime water correction. We used the U.S.P. process and

applied a correction by means of the ash method. The results are given below:

| | Crude Morphine. | | Pure Morphine. |
|---|---|---|---|
| Smith | 17·27 | Squibb's process | 16·13 |
| | 16·78 | U.S.P. process | 16·19 |
| LaWall | 17·11 | | 16·09 |
| | 17·04 | | 16·03 |

Ten cases of opium from one consignment were assayed under most favorable conditions, in reference to temperature, amount of washings and time of shaking out the morphine. The first five cases were assayed one day, and the remaining five, two days later. The results were as follows:—

| No. | Crude Morphine. | Pure Morphine. | Moisture. | Crude Morphine in Dry Opium. |
|---|---|---|---|---|
| 1. | 12·34 | | 20·52 | 15·53 |
| 2. | 12·38 | | 20·35 | 15·55 |
| 3. | 12·39 | 11·36 | 20·81 | 15.65 |
| 4. | 12·33 | | 20·04 | 15·35 |
| 5. | 12·34 | | 19·58 | 15·34 |
| 6. | 12·65 | | 20·32 | 15·88 |
| 7. | 12·78 | | 19·55 | 15·89 |
| 8. | 12·74 | 11·64 | 19·51 | 15·83 |
| 9. | 12·79 | | 19·17 | 15·82 |
| 10. | 12·48 | | 20·79 | 15·75 |

A glance at the above figures shows a uniformity in the quality of opium hitherto unnoticed in assaying large consignments. The additional circumstances of the presence of wheat starch in the opium, and strontium in the ash, would indicate a previous manipulation of a large quantity of opium, before packing it into cases for shipment.

The perplexing part of this view lies in the fact that the yield of morphine is still several per cent. higher than the limit required by the custom house; since it would be just as easy to reduce the morphine to 10 per cent., thus making an additional profit and still be above the legal standard.

The question naturally arises, can starch or epidermal tissue, or rumex seed, or strontium sulphate, or the calcareous salts found in Turkey opium be classed as adulterants of opium in the true sense of the word? We all know that the opium as it comes into the market is the concrete juice of the poppy, mixed with various and sundry substances, and to say that this or that is an adulterant of

opium, would require an explicit and comprehensive description of what is, and what is not, an adulterant. For an analyst to condemn a case of opium, on the ground that it contained starch, when the only requirement is a certain amount of morphine, would lay himself open to criticism. We, however, do think that a substance like strontium sulphate, which increases the apparent yield of morphine, ought to be looked on as an adulterant of a fraudulent nature.

305 Cherry Street, Philadelphia.

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## ON THE PRESERVATIVES OF PHARMACOPŒIAL PREPARATIONS.[1]

By William Martindale.

In the work of compiling formulæ for the use of medical practitioners and pharmacists, care is necessary to test the keeping properties of the various solutions and preparations, and having prepared and kept a number of these preparations, I thought a few notes on them might prove interesting. They are purely pharmaceutical, and must not be considered as having bacteriological importance.

The vehicle mostly used for the internal administration of medicines, of course, is water in some form or other, but distilled water alone is recognized by the Pharmacopœia, and probably this, as frequently met with, is more defective from a standard of purity than most preparations in the Pharmacopœia. It is even more prone to develop minute organisms than many of the spring waters that are to be met with, although these may contain inorganic salts, which render them unsuitable as solvents and vehicles in which to administer medicinal preparations. So much has distilled water obtained this evil reputation that a bacteriologist of eminence is reported to have said that one of the best incubating fluids was a certain manufacturer's distilled water.

Various means have, therefore, been adopted for sterilizing it and rendering it aseptic for pharmaceutical use, such as keeping it in a cool place, and, of course, free from dust, and having it recently well boiled and cooled. The best and only method to be depended upon, however, care having been taken to select a good water for distillation, as well as to refuse the first and last products, and to ensure

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[1] *Pharmaceutical Journal*, March, 13, 1897.

freedom from contamination afterwards, is to have it freshly distilled; in fact as regards the whole of the preparations of the Pharmacopœia, they should be as freshly prepared as possible, and the use of preservatives should be avoided unless absolutely necessary, but from a practical point of view we cannot do without them. For example, the public demand for pills is now that they must be well preserved and look nice, although they may be insoluble.

*Alcohol*—The most common preservative used officially is alcohol in one form or another; it is true that it is not used solely as a preservative, but as a solvent; it enters more or less into the composition of nearly all our tinctures, liquid extracts, wines, and many of our official solutions. The germination of most of the micro-organisms occurring in aqueous solutions of vegetable and animal substances is inhibited by the presence of 20 per cent. by volume of absolute alcohol, but it is inhibitory only, and in this proportion or upwards; it is in no way germicidal, as on evaporation the anæsthetized germs, if I may so term them, readily take up life and propagate. This applies to most of the volatile antiseptics, in fact, for organic tissues, such as strong mineral acids, alkalies and halogens. Exceptions to this are carbolic acid, creosote, and weak solutions of corrosive sublimate, which act probably by coagulating the albuminous substance of the microbe. Wines I have mentioned; unless fortified, from their very origin, that of fermentation, they are too weak to prove of useful service in pharmacy, and in fact medical wines are anachronisms.

*Glycerin.*—The abuse of alcohol has led those who take extreme views on this subject to endeavor to use other solvents and preservatives for pharmaceutical preparations. Among these, avoiding ethylic alcohol, whose physiological properties are too well known, they have selected glycerin, which is but another alcohol whose action physiologically is not so well ascertained, nor is it so inhibitory to the development of micro-organisms. Its strong solvent action on vegetable extractives, its non-volatility, and its stability in other respects would have rendered glycerin a useful pharmacopœial solvent, but although it has been tried again and again and was made official, more especially in preparing some of the liquid extracts of the United States Pharmacopœia, it has not met with general acceptance. It nevertheless has a curious preservative action over some inorganic compounds in preventing oxidation.

For example, black mercurial lotion can be preserved in its normal black color by the addition of 5 per cent. by volume of glycerin, but I find that 10 per cent. of mucilage of tragacanth will produce the same result, and have the advantage, from its viscosity, of holding mercurous oxide well suspended; the addition of both these to the preparation would be an advantage. It has further been suggested that glycerin should be used to preserve sublimate solution, especially the official liquor hydrargyri perchloridi, as it has been thought necessary that this solution requires preserving, from the chemical, not, of course, from the biological point of view. But both glycerin and alcohol added to this solution, especially if exposed to light, cause a reduction of the salt and deposition of mercurous chloride, as in the official solution of the Codex, which contains 10 per cent. of alcohol. Notwithstanding statements to the contrary, I find that a simple solution of mercuric chloride in distilled water, or even in spring waters containing supercarbonate of lime in solution, is more stable than it is with a preservative added, especially one of such a nature as chloride of ammonium in the official solution. This, as I showed so long ago as 1870,[1] instead of being a preservative, forms a double salt in solution (sal alembroth *plus* an excess of chloride of ammonium), and the solution, if prepared with common water in place of distilled water, or even if prepared with distilled water and diluted, throws down a quantity of one of the white precipitates of mercury. To such an extent is this the case that I found in preparing a pint of the official solution with new river water in place of distilled water, that 2.7 grains of this precipitete was deposited, thus about one-fourth of the mercurial salt was rendered insoluble in preparing the solution, and more deposited on further dilution with the water. In fact, a time arrived when there was scarcely a trace of mercury salt in solution, and as this preparation is most largely used in hospitals where common water is always used to dilute the medicines, it leads to very discrepant results therapeutically. It has also been suggested that chloride of sodium should replace chloride of ammonium in the official solution, as this salt is largely used in making the sublimate tablets for the convenience of surgeon's use, but I have found that although sodium chloride helps these tablets to disintegrate readily it has no advantage, in fact it is detrimental to the keeping properties of the solution. I have here

[1] *Pharmaceutical Journal*, [2] Vol. XI. p. 544.

two specimens prepared in November, 1895, with water from the Brighton constant supply, which is a very calcareous water; one is a simple solution of the perchloride, and the other has an equal weight of pure chloride of sodium added. The latter you will observe has deposited much more than the former, in which there is hardly a trace of deposit. This strongly illustrates the undesirability of tampering with solutions in order to make them, as we consider, more stable; in fact, with few exceptions no preservative should be added to a pharmacopœia preparation unless the label indicates boldly that it is there. While on the subject of mercuric salts, I should like to illustrate the importance of having our lime water of full strength, and well preserved.

In making the yellow mercurial lotion of the B.P., which has 18 grains of sublimate to 10 ounces of lime water; if the lime water be only three-fourths, or from keeping, so low as one-half the pharmacopœial strength, a brick-red preparation, an oxychloride is produced, rather than the yellow mercuric oxide.

*Acetic Acid.*—Of other preservatives, which are also solvents used officially, acetic acid of varying strengths is employed, as in acetum cantharidis and acetum scillæ. This, as I notice Prof. Remington recently points out,[1] was much employed in the pharmacy of the ancients, sometimes combined with honey to form oxymels, of which we have inherited both the vinegar and the oxymel of squill. Acetic acid has the disadvantage, however, unless in a very concentrated form, of growing micro-organisms abundantly, and the fungi and animalculæ developed in brown vinegar must be well known to all of you. Acetic acid, therefore, besides being incompatible with alkalies, is not a good preservative, although in some cases it may be a useful solvent.

*Sugar.*—Of the preservatives used officially which are not solvents, this is employed most extensively, not only with us, but in France and in the United States; in fact, so much is this the case in France, that Mr. Ince once remarked in this room that French pharmacy might be summed up in one word, "sugar." On account of its palatability it of course meets with favor, especially among children. It enters into the composition of all the syrups and lozenges, and most of the confections and powders, and is a useful preservative from oxidation of the ferrous preparations, such as the

[1] *American Journal of Pharmacy*, March, 1897, p. 121.

saccharated carbonate of iron, mixture of iron, Blaud's pill, and iodide of iron pill. It also preserves lime in solution, as in the well-known liquor calcis saccharatus, of a strength about sixteen times that of the official lime water; if a pure marble lime be used, I find as much as 1·77 per cent. is dissolved, or 8·16 grains in a fluid ounce. This preparation is more conveniently made by using an equivalent weight of syrup, *i.e.*, three ounces in place of two of sugar, and adding it to nineteen ounces of distilled water containing the lime in suspension. The "caking" which is apt to occur is thus avoided.

*Salicylic Acid.*—The well-known uses antiseptically of this for surgical purposes, although prohibited from being used for preserving wines in France, have rendered it servicable in preserving the official solution of hydrochlorate of cocaine, which contains 1½ per mille of the acid, with 10 per cent. of the cocaine salt. I find that this solution, even if diluted with four times its volume of water, still keeps free from fungoid growths. The use of this acid might be objected to in the solution, because salicylic acid forms with cocaine an indefinite compound rather than a salt, the so-called salicylate of cocaine; but it appears not to throw the hydrochloric acid out of combination, and has proved very serviceable in preserving the solution of this cocaine salt, which has a great tendency to develop fungoid growths. The salicylic compound appears to be allied to the benzoic compound, benzoyl-ecgonine. It forms a pasty mass which has not, that I am aware of, been studied. If any defence were needed for using a preservative, perhaps this official solution of cocaine is a typical case. The use of this solution of salicylic acid, 1½ per mille, which is nearly saturated, as a vehicle, might be extended to other solutions, for example, the official solution of sulphate of atropine, but I have not found this solution, if made with a well-crystallized salt, prone to grow fungi. Its use, however, cannot be extended to the hypodermic injection of morphine; if a solution of tartrate of morphine, 1 in 12, or even 1 in 20, be prepared in it, a crystallized salicylate of morphine separates; 16½ tartrate keeps well alone.

Of the salts of morphine suitable for hypodermic injection, the tartrate seems to be now favored; the acetate solution, prepared by dissolving pure morphine in just enough acetic acid, has till lately been mostly used, but it has the objection of possessing a

tendency to decomposition and becoming muddy and dark-colored. Still I have two solutions here over 18 years old, no extra sterilizing precautions were taken when made; they are well preserved and are perfectly transparent, although they have slightly changed color. One is of the strength of 1 grain in 6 minims, which I advocated in a paper in 1870,[1] the other is 1 grain in 12 minims. A small dose is generally preferred for hypodermic injection, but the strength of 1 grain in 6 minims is considered now to be dangerously strong in the hands of an unskilled operator. The more nearly saturated, however, the aqueous solution of any salt or crystalline principle is, the better it will keep; in fact, it was a curious argument of an advocate for spontaneous generation that there was a debatable land between that of crystallization and the germination of organisms in these solutions—that is, between the growth of crystals and of organisms; this applies widely in pharmacy, as we well know, in keeping syrups for example. A nearly perfect syrup consists of two parts of sugar and one of distilled water; kept at a uniform temperate heat, this neither crystallizes nor grows fungi; and our solid medicinal extracts are preserved if they contain no excess of moisture.

Further, these remarks especially apply to the official solutions of acetate and citrate of ammonium, which are much better kept in a concentrated form.

The salicylic acid solution cannot either be used for preparing the hypodermic injection of apomorphine; a 1 per cent. solution of the hydrochlorate of apomorphine prepared in it gives a quantity of a crystalline deposit.

Hydrochlorate of apomorphine in aqueous solution rapidly develops a green color; this has been attributed to the influence of ammonia in the atmosphere, but although a drop of solution of ammonia does develop the green color immediately, it is apparently not due to this alone. This salt is now prepared much purer than formerly, and it is also not so soluble. The official strength of the hypodermic injection, 1 grain in 50 minims, *i.e.*, 1 in 45.5 parts, of camphor water is not held in solution at 60° F. Dott gives the solubility in water as 1 in 50.89, Squire as 1 in 56 to 60. I find 1 part in 60 of boiled and cooled distilled water dissolves, but turns green within a few hours, but if acidulated with a trace of hydrochloric acid, say an equal weight of the official diluted hydro-

[1] *Pharmaceutical Journal*, [2] Vol. XI, p. 480.

chloric acid, the color is preserved, but it is rendered less soluble. More than 1 per cent. solution, if acidulated, is not certain to keep free from crystals at the variable temperatures to which it may be exposed, and less than the quantity of acid I have named does not keep it free from color.

*Sulphurous Acid.*—A trace of sulphurous acid, say one-quarter per cent., added to a 2 per cent. solution of the apomorphine salt, keeps the solution for a moderate time, but not indefinitely, and the use of such a deoxidizing agent is not desirable, as its action on the apomorphine salt is not clearly understood. Nevertheless, sulphurous acid is largely used as a preservative of such preparation as orange wine.

*Boric Acid.*—Of the preservatives suggested for keeping apomorphine injection, boric acid has been mentioned, but this I find, in a solution containing 2 per cent. of each, boric acid and hydrochlorate of apomorphine, forms an opaque white jelly, and even with 1 per cent. of each, a curious translucent jelly is formed, quite unsuitable for hypodermic injection. Boric acid has been recommended and is used largely for preserving solutions for hypodermic injection, but as a solution of it, 1 in 30 parts of water, which is nearly saturated, will itself develop some peculiar fungi, I can see little advantage in employing such a preservative pharmaceutically. Mr. Lee has mounted a specimen of a *torula* which has been grown in a saturated solution of boric acid in distilled water.

*Camphor Water.*—The same remarks apply to camphor water, the favorite of Raspail, as to boric acid. It is a weak inhibitor, and it further has the disadvantage of the camphor being volatile. Camphor water is official as the solvent of atropine in the solution of sulphate of atropine, but oculists complain of the irritating action of camphor in the eye.

*Chloroform.*—The addition of chloroform to vegetable infusions and other aqueous preparations of vegetable and animal substances was recommended by Mr. J. B. Barnes[1] in the proportion of from one eighth to one-half per cent. by volume. The addition of chloroform as an inhibitory in suspended pharmaceutical operations is of great service, and it has the advantage that by gently warming the solution for a short time it can be easily dissipated, but it has also the disadvantage that the chloroform evaporates too easily for pro-

[1] *Pharmaceutical Journal*, [3], Vol. V., p. 441.

longed preservation, yet I have tried the experiment of preserving fruit (damsons) in stoppered bottles, adding about one three-hundredth part of their weight of chloroform to them. The preservation was complete, but the flavor of the chloroform was not dissipated by even baking the fruit in pies.

*Hydrate of Chloral* has been used as possessing similar properties to chloroform, being more readily soluble and less volatile, but its taste is nauseous.

*Carbolic Acid.*—The odor and flavor of this most powerful antiseptic is against its use for internal administration, excepting for hypodermic injections; it is the best preservative for ergotin in aqueous solution. Boric acid in this solution fails; Mr. Severn kindly infected for me three solutions of ergotin with *Penicillium glaucum*; No. 1, without preservative added, developed in forty-eight hours; No. 2, with 1 per cent. of phenol added, is undeveloped yet, after five days; No. 3, with 2 per cent. of boric acid, developed on the side of the bottle, just above the surface of the liquid, in seventy-two hours. Creosote also, although one of the best preservatives, as its name indicates, is not admissable, on account of its odor.

*Cherry Laurel Water.*—This is recommended in France for preserving hypodermic injections. So, also, are the distilled waters of meadow sweet and eucalyptus. I am not aware that

*Formaldehyde* has been much used pharmaceutically, although it has, I understand, been used for milk preserving for some time. Its peculiar action on gelatin in rendering it insoluble would tend to prove that it was not desirable for internal administration, as it might seriously interfere with digestion.

*Hypophosphorus Acid.*—This and *citric acid* are employed commercially to prevent the change of color of the ferrous syrups; as traces only are needed, it may be considered a venial offense. But preservatives are sometimes used, or are added even officially, which are often disadvantageous. For example we have two arsenical solutions official, one acid and the other alkaline. A simple solution of arsenic anhydride in water of the same strength, colored if desired, is perfectly stable. It would be compatible with both acids and alkalies, and might take the place of both the official solutions.

*Carbonic Acid.*—This in solution in water is inhibitory to organic growths, and is largely used in preparing carbonated waters and "Fluid Magnesia," but otherwise it is not of much service.

*Benzoic Acid.*—For preserving lard and some official ointments, the melted fats are macerated with powdered benzoin, by which means they obtain an agreeable odor and become impregnated with benzoic acid. Both these tend to preserve the fats from becoming rancid. But in using these fats for preparing the ointments of the alkaloids, apparently some change takes place; they become discolored, and in the case of cocaine we know, as I have before mentioned, a comparatively inert compound of benzoyl-ecgonine, etc., is formed, so that the use of benzoated lard is to be avoided for preparing these ointments.

*Paraffin Basis.*—Where quick absorption is not required, the preservative action of the soft paraffins renders them all that can be desired, as also is oil of theobroma for suppositories.

*Aromatic Waters and Essential Oils.*—The oils of clove, cinnamon, peppermint, and many others are preservatives; so are their aqueous solutions, but I can only mention them.

*Heat and Cold.*—A gentle heat assists the incubation of nearly all micro-organisms; a greater heat, that of boiling water for example, is a sterilizer; whereas a still higher temperature is a disorganizer, and is destructive to all organic growths. Cold, on the contrary, the freezing point of water and below, as a rule, is only inhibitory to the development of the lower organisms, their vitality is but suspended, and they spring into life again with the first application of a gentle warmth. It may appear irrelevant to my subject, but the important bearing preservatives have on our food supplies, including frozen meat, makes them of great importance commercially. In fact, in viewing the pharmaceutical aspect of preservatives, I have but touched the fringe of the subject of their utility. Without the aid of boric acid and other preservative, many of our articles of daily food would be at famine prices. In such a condensed population as that of London, it would now be almost impossible to supply the necessary quantities of butter, milk and fish in a fresh condition. We have long been dependent to a great extent on the importation of flour and corn. The same has now become the case in regard to our animal food products.

# THE PRODUCTION OF CAMPHOR IN CHINA.[1]

BY AUGUSTINE HENRY.

The camphor tree, Cinnamomum camphora, Nees et eberm, is indigenous to Japan, Formosa and the central and southern provinces of China. It has been known to the Chinese from ancient times, but apparently until 300 or 400 years ago only as a valuable timber tree.

The camphor first in use was undoubtedly the Malay camphor, and as Hanbury says ("Pharmacographia," p. 511), "at what period and at whose instigation the Chinese began to manufacture camphor from the camphor laurel is not known." Hanbury further states that "The camphor of European commerce is produced in Formosa and in Japan, and we have no evidence that any is now manufactured in China, although very large trees, often from 8 to 9 feet in diameter, are common; for instance, in Kiangsi, a camphor wood is an important timber in the Hankow market." The latest references to camphor production ("Index Floræ Sinensis" II., p. 371) further would confirm this, viz., "Kwangtung, common around Pakhoi, but not utilized" (Playfair). Again, "Dr. Henry states that the wood is much used in Central China, but no camphor is extracted."

Until a few years ago, then, no camphor was produced on the mainland of China, but it is interesting to note that the camphor industry has been started in China, and that there are signs that it will become important. This is all the more noteworthy, as Formosa has become Japanese territory, and it seemed likely that camphor would become an entirely Japanese article, not a desirable contingency in view of the fact that the Japanese Government is striving to establish a monopoly in the production of camphor in Formosa, and has no doubt in contemplation the creation of a large revenue by enhanced prices in the future.

For a history of the vicissitudes of the camphor trade in Formosa itself the reader is referred to the "Chinese I. M. Custom, Decennial Reports" for 1882-91, pp. 439, 466. *En passant*, this is a most valuable work for all questions connected with Chinese commerce, the history of the treaty ports, etc. It is replete with information of all kinds, and is illustrated with maps, plans, and diagrams.

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[1] *Pharmaceutical Journal*, March 6, 1897.

GROWTH OF THE CHINESE CAMPHOR INDUSTRY.

The growth of the camphor industry on the mainland of China is shown by the following facts taken from various China Customs' Yellow-books. From the "List of Chinese Medicines," miscellaneous series, No. 17, which gives details of the trade in drugs of all kinds for the year 1885, it appears that camphor was unknown as a product of the mainland, except in the single province of Chekiang, there being the small export that year from Ningpo of 25 piculs. Ningpo exported 32 piculs in 1889, 40 piculs in 1890, and none since, apparently. The Customs' "Trade Reports," for the different years show the gradual appearance of camphor production in other parts. Kowloon exported 88 piculs in 1888, 106 piculs in 1892, 87 piculs in 1893. This was conveyed in junks, and its *provenance* is doubtful, but it was perhaps from the province of Kwangsi. Canton exported 122 piculs in 1893, 37 piculs in 1894, and 237 piculs in 1895. This is Kwangsi camphor. The Pakhoi Trade Report for 1894 states that the first record of the article was in 1892; in 1893 the export was 23 piculs, which increased to 128 piculs in 1894, and "it comes from Lu-chuan, near Yü-linchow, and is likely to grow in importance, as plantations in that and other places in the neighborhood are coming to the bearing age." In the Pakhoi Trade Report for 1895, the export is given as 596 piculs, and the writer says that this gratifying increase is due to the extended cultivation in Kwangsi. In Formosa, only old and enormous camphor trees are utilized, and I am inclined to doubt the existence of camphor plantations in Kwangsi; the camphor produced is more likely to be from old forest trees. The Chinese, at any rate, did not plant any trees with a view to the manufacture of camphor.

EXPORT OF CAMPHOR FROM CHINA.

In 1895 the exports of camphor from different Chinese ports was: Foochow, 187 piculs; Amoy, 668 piculs; Canton, 237 piculs; Kowloon, 68 piculs, and Pakhoi, 596 piculs. In the Fukien province there are large forests and camphor trees abound. Some years ago, a party of Japanese went into the interior of Fukien to manufacture camphor, but nothing came of this attempt. The Foochow export is probably the product of this province, but that of Amoy is doubtful, as it may be Formosan camphor smuggled over to the mainland in junks. The export of the other three ports is produced in the

Kwangsi province, and this will probably grow into large figures, if camphor continues high enough in price to encourage the Chinese in its manufacture.

To sum up, the production of camphor on the mainland of China is an affair of the last few years. It began in Chekiang, but has practically ceased in that province. In Kwangsi it commenced a short time ago, and promises to develop into importance. The Fukein product is only trifling so far.

## EDITORIAL.

### EDSON SEWELL BASTIN.

On the morning of April 6, 1897, Edson S. Bastin passed away, after an illness of several months. His funeral took place at Merchantville, on the 9th, and was largely attended by members of the College and students.

The Board of Trustees was in session when the sad news reached them, and a series of resolutions were directed to be drawn up for approval at a subsequent meeting. Two days later a special meeting of the College was held, and appropriate resolutions were directed to be drawn up to express the sentiments of that body.

It is merely desired to record the foregoing facts at the present time; a memorial will be prepared and published in a subsequent number of this JOURNAL. It is but justice to say, at this time, that while Professor Bastin's occupation of the Chair of Botany and Materia Medica in this College was short in duration, it was long when measured by results accomplished. More than that, he won the respect, confidence and admiration of every one with whom he came in contact during the short four years he was with us.

### THE AMERICAN MEDICAL ASSOCIATION.

The fiftieth annual meeting of the Association will be held this year in Philadelphia, during the first week in June. As the Association originated in this city fifty years ago, more than ordinary efforts will be made to have a notable meeting. Elaborate preparations have already been made by the Committee of Arrangements for the extraordinary attendance which is anticipated. The section on Materia Medica and Therapeutics has been invited to hold its sessions at the Philadelphia College of Pharmacy.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

DES ACANTHACÉES MÉDICINALES. Par Georges Dethan. Deuxieme Édition. Paris: A. Malone, 1897. Pp. 192.

Two months ago we briefly reviewed the first edition of this work, which was issued as a thesis which had been presented to the École Supérieure de Pharmacie de Paris. The present edition has been revised, corrected and enlarged.

OBSERVATIONS ET EXPÉRIENCES SUR L'OUVERTURE DES FLEURS DE L'ŒNOTHERA LAMARKIANA, SER. Par M. Louis Planchon. Reprint from the *Bulletin* de la Société botanique de France, November, 1896. This is a close study of the process of opening of the flowers of œnothera, and it throws much light on the subject in general.

VIOLA TRICOLOR, L., IN MORPHILOGISCHER, ANATOMISCHER UND BIOLOGISCHER BEZIEHUNG. Von Henry Kraemer. Universitäts-Buchdurckere's von Jh. Aug. Koch, Marburg, Germany, 1897.

Professor Kraemer has carefully worked out the life history of this interesting plant, and at the same time has added to the value of the work by an elaborate series of illustrations. The results are presented in twelve sections, the last being a short account of what is known at the present time of the chemistry of the plant. As pointed out by earlier investigations, salicylic acid is the most interesting compound; it exists partly as a methyl salicylate, and partly in combination with various inorganic salts. A valuable bibliographical index completes the work.

ON THE CONSTITUENTS OF THE SAP OF THE "SILKY OAK," GREVILLEA ROBUSTA, R. BR., AND THE PRESENCE OF BUTYRIC ACID THEREIN. By Henry G. Smith, F.C.S. Read before the Royal Society of New South Wales, October 7, 1896. In a previous communication on the timber of this tree, the author, in conjunction with J. H. Maiden, has pointed out the presence of a deposit of aluminum succinate. Now, having demonstrated the presence of butyric acid in the sap, he is led to believe that the succinic acid is derived from butyric acid by natural oxidation in the tree.

THE DYEING PROPERTIES OF AROMADENDRIN AND OF THE TANNINS OF EUCALYPTUS KINOS. By Henry G. Smith, F.C.S. Reprint from the *Journal of the Society of Chemical Industry*, November 30, 1896.

UEBER FLECHTENSTOFFE. Von Dr. O. Hesse. Reprint from *Berichte d. deut. chem. Gesellschaft*, 30, 357.

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# EXAMINATION QUESTIONS OF THE PHILADELPHIA COLLEGE OF PHARMACY, 1896-97.

## FIRST YEAR EXAMINATION.

### PHARMACY.

*A—Crystallization.* (1) Describe the method of obtaining crystals by deposition from supersaturated solution. (2) Define pellicle. (3) Water of crystallization. (4) Interstitial water. (5) Efflorescence. (6) Deliquescence. (7) Mother liquor. (8) What is intermediate crystallization?

*B—Syrups.* (1) Define syrups. (2) Name five methods for official syrups. (3) What kind of sugar is best adapted for making syrups, and give the reasons for preferring this kind of sugar. (4) Describe a method of preserving fruit juices in bottles, and state the causes which lead to the decomposition of solutions containing organic matter, if not protected.

### CHEMISTRY.

*C—Halogen Group.* (1) Enumerate the elements belonging to the Halogen group, and briefly describe the physical appearance of each of them. (2) Give the formulas of their hydrogen compounds, and state which of them are official compounds. (3) Write a chemical reaction for the production of one of these elements and a chemical reaction for the production of one of the hydrogen compounds above mentioned.

*D—Phosphorus.* (1) Describe the element phosphorus in its several forms

(2) From what sources do we obtain it, and what are its practical uses? (3) Give the chemical formula for hydrogen phosphide, and state how it is obtained.

BOTANY.

*E*—(1) In what group of plants are the sporophyte and gametophyte generations nearly equal in development? (2) In flowering plants, what two kinds of spores are produced, and in what organs are they borne respectively? (3) In most of the higher plants, into what organs are root and shoot differentiated? (4) Define the terms sporophyll and hypsophyll, and give examples of each as they occur in the flowering plant. (5) What are the microsporangia and macrosporangia commonly called, respectively, in the flowering-plant? (6) What peculiarities in the leaf venation and in the numerical plan of the flowers enable us, usually, to distinguish a monocotyl from a dicotyl? (7) Name examples of each of the following kinds of fruits: a syconium, a drupe, a legume, a pepo, and an akene.

*F—Materia Medica.* (8) Describe Uva-ursi as to the following points: length, shape, surfaces, venation, margin, texture, taste, a medicinal constituent, and the chief use of the drug. (9) Name two official leaves which possess internal glands. (10) State the important structural differences between German and Roman chamomile.

COMMITTEE.

*G—Glycerin.* (1) Name three principal reasons showing its value in pharmacy. (2) What official class of preparations contains glycerin as a base? (3) What is glycerin, and what is its principal use?

*H—Chemical Terms.* Write concise *definitions* of each of the following chemical terms: (1) matter; (2) elements; (3) atoms; (4) atomic weight; (5) equivalence or valence; (6) molecules; (7) molecular weight; (8) equation; (9) chemical reaction; (10) acids.

*I—Problem.* A laboratory formula called for 8·5 kilos of 50 per cent. orthophosphoric acid. How much of the U.S.P. phosphoric acid (85 per cent.) would be required to take its place in the formula? Show the figures used to obtain your result.

*K—The Flower.* (1) Define the term sporophyll. (2) State what two kinds of sporophylls occur in the flowers of most of the higher plants. (3) State what they are commonly called, respectively, and what is the function of each. (4) State, also, what other modified leaves the flower may possess.

OPERATIVE PHARMACY.

(*1*) *Specific Gravity.*

Determine the specific gravity of the liquid contained in the four-ounce bottle; put all calculations on the sheet of paper, with your name and examination number.

(*2*) *Percolation.*

Percolate 100 grammes of gentian, with 500 c.c. of water. Label the percolator with your name and examination number.

(*3*) *Granulated Salt.*

| | |
|---|---|
| Acid Salicylic . . . . . . . . . . . . . . . . . . . . . . | 7 gm. |
| Sodium Carbonate C. P. . . . . . . . . . . . . . . . . . . | 6·5 gm. |
| Distilled Water q. s. . . . . . . . . . . . . . . . . . . . | |

Make Sodium Salicylate. Put in the wide-mouth bottle.

PHARMACOGNOSY.

In this branch each student was given specimens of ten official vegetable drugs, and was required to give the official name and common names, if any, and also describe the chief characteristics of each specimen.

SECOND YEAR EXAMINATION.

PHARMACY.

*A*—(1) What is the official name for Solution of Hydrogen Dioxide? (2) What is the synonym? (3) What is the official description? (4) Give a brief outline of the process for preparing it. (5) What are its uses?

*B*—(1) What is the official name for Solution of Ferric Chloride? (2) What is the official description? (3) Give a brief outline of the process for preparing it. (4) If the finished solution has a blackish tint, what is it due to? (5) How may this be removed?

*C*—(1) What is the official name for Ether? (2) What is its specific gravity? (3) How is it made on the large scale? (4) What are its physical properties and uses? (5) Is Ether vapor heavier or lighter than air?

*D*—(1) Explain the natural changes which occur in the pulpy constituents of unripe fruits during ripening. (2) Have fleshy roots any of the constituents of unripe fruits? If so, name them. (3) Explain the reasons for adding ammonia-water to preparations of glycyrrhiza and senega. (4) How do acids and heat affect the constituents of fleshy roots?

*E*—What are the essential points of difference between a volatile oil and a fixed oil? By what test may one be distinguished from the other? What is oleic acid? How is it prepared? What are its uses in pharmacy and medicine? Describe the manufacture of Soap? What is Sapo Mollis? How is it prepared? What is Castile Soap chemically? And what useful by-product results from the manufacture of Soap?

CHEMISTRY.

*F*—(1) Give the reactions for the production of Sodium Carbonate by the Leblanc process? (2) Give the reactions for the production by the Ammonia-Soda and Cryolite processes? (3) State what are the by-products in each of these processes and which of them are of value.

*G*—(1) Describe the metal Copper and state from what ores it is obtained. (2) Describe *Cupri Sulphas* U.S.P. What is the change of appearance effected in it by prolonged heating? What is the result of the addition of aqua ammonia to copper sulphate solution? (3) Mention the more important alloys of copper, stating the several components of each.

*H*—(1) How is the metal Aluminum obtained? (2) Give the chemical formula of *Alumen* U.S.P. (3) Describe silicate of aluminum and state its uses.

*I*—(1) Describe the more important tests for the detection of Arsenic. (2) How would you distinguish Arsenic from Antimony in these tests? (3) Describe *Acidum Arsenosum* U.S.P.; give its chemical formula and its common name.

*K*—(1) Enumerate the several varieties of glass and state their approximate chemical composition. (2) What is "soluble glass?" (3) Mention some of the materials used in coloring glass?

MATERIA MEDICA AND BOTANY.

*L*—*Tissues.* (1) Enumerate the different kinds of tissues found in plants. (2) Define meristem and state how its cells differ from ordinary parenchyma

cells. (3) In what parts of an ordinary tree, such as the elm, for example, does meristem occur? (4) State how the wall of an ordinary parenchyma cell, that of an ordinary epidermal cell, and that of an ordinary wood fibre differ from each other in their chemical and physical properties.

*M—The Structure of Stems, Roots and Leaves.* (5) In what respect does the growing tip of a Fern stem differ from that of a Dicotyl stem? (6) What three layers are recognizable at the growing tip of a Dicotyl stem, and into what regions do these layers develop, respectively, as the stem matures? (7) What kind or kinds of vasal bundles are characteristic in each of the following organs: the root of Sarsaparilla, the trunk of a Pine, the stem of Lycopodium, the rhizome of Aspidium, and the stem of the Pumpkin. (8) Define the terms centric, bifacial, and iso-bilateral as applied to leaves.

*N—Root and Rhizome Drugs.* (9) Write the *official name*, the *common name*, the *natural order*, *botanical name*, the *name of the country* from *which derived*, the *most important chemical constituent*, and the *most important medicinal property* of each of four official root-drugs. (10) Write the official names of two root-drugs which contain milk-tissue. (11) Name two official root-drugs that owe their activity to poisonous alkaloids, giving also the name of the alkaloid in each case. (12) Name two root drugs and one rhizome-drug, all of which are official and all characterized by an intensely bitter taste.

*O—Root and Rhizome Drugs.* (13) State the sources of each of the following principles, giving the official name of the drug in each case: *Leontin*, *Chelerythrine*, *Sylvacrol*, *Atropine*, *Chrysophan*, *Emetine*, *Pelosine*, *Filicic Acid*, *Jervine*, and *Aristolochine*. (14) Name four official drugs belonging to the groups of Roots and Rhizomes that are powerful narcotic poisons. (15) Describe the structure of Belladonna Root. (16) Write the official names of each of the following drugs: Pinkroot, Blue Cohosh, Mayapple, Cranesbill and Marshmallow.

*P—Barks, Woods, etc.* (17) Name three official barks, each of which possesses three layers, and three others, each of which consists of the inner layer only. (18) What official bark is very tough and flexible, has silky bast-fibers, is very sternutatory when powdered, is acrid to the taste, and is capable of producing a blister when moistened and applied to the skin? (19) Name two official barks which have short and rigid bast-fibers, two which possess long and flexible ones, and two that possess none. (20) Name an official bark that is *febrifuge*, one that is *pectoral*, one that is *taenifuge*, one that is *cathartic*, and one that is *demulcent*.

### SPECIMENS FOR RECOGNITION.

(1) Acidum sulphurosum. (2) Plumbi oxidum. (3) Sodii hyposulphis. (4) Alumen. (5) Plumbi Acetas. (6) Belladonnæ radix. (7) Podophyllum. (8) Aspidosperma (Quebracho). (9) Eriodictyon (Yerba Santa). (10) Strophanthus. (11) Pulvis rhei compositus. (12) Aqua chloroformi. (13) Spiritus juniperi compositus. (14) Emulsum chloroformi. (15) Tinctura calumbæ.

## SENIOR EXAMINATION.

### THEORY AND PRACTICE OF PHARMACY.

*Put down on your paper all the figures used in making your calculations.*

*A*—How many fluid ounces are there in a kilogramme of each of the follow-

ing official liquids? (1) Water. (2) Hydrochloric acid. (3) Ether. (4) Syrup. (5) Diluted Alcohol.

*B*—Give the unabbreviated official name; ingredients in preparing; describe the appearance of—(1) Compound Infusion of Gentian. (2) Fluid Extract of Ginger. (3) Soap Liniment. (4) Compound Syrup of Rhubarb. (5) Spirit of Peppermint. (6) Emulsion of Chloroform. (7) Compound Extract of Colocynth. (8) Plummer's Pills.

*C*—Give the English name, ingredients, and brief outline of process of the following: (1) Calx Sulphurata. (2) Argenti Nitras Fusus. (3) Ferri et Strychninæ Citras. (4) Emplastrum Plumbi. (5) Pilulæ Ferri Carbonatis. (6) Unguentum Aquæ Rosæ. (7) Pulvis Purgans. (8) Spiritus Glonoini.

*D*—(1) What is Monsel's Solution? (2) How is it prepared? (3) What are its uses? (4) What antidote is prepared from it? (5) How is the antidote made? (6) How is the antidote administered?

*E*—(1) How is Chloroform prepared? (2) What is its specific gravity? (3) What are its uses? (4) What is the official test for purity? (5) How is it preserved? (6) Is its vapor inflammable? (7) Name three official preparations in which Chloroform is used.

*F*—(1) What is Copaiba? (2) What are its constituents? (3) What official preparation is made from Copaiba? (4) Give the process for this preparation. (5) How is this preparation administered? (6) What is the dose?

*G*—(1) What is Chocolate? (2) How is it made? (3) What is the official name of the fatty constituent? (4) What is the English name of this constituent? (5) How is this constituent prepared? (6) What are the pharmaceutical uses of this constituent? (7) What is its melting point?

*H*—(1) Describe the apparatus for making Compressed Pills. (2) What are the advantages of Compressed Pills? (3) What are the disadvantages? (4) How are Tablet Triturates made? (5) How are Tablet Saturates made?

*I*—Criticise the following prescriptions. Write out the English name of each ingredient; state how you would compound each, and if any incompatibility would be developed in either; state what it is, and what would be the proper procedure.

℞ Chloral Hyd . . . . . . . . . . gr. xl
Camph. Pulv. . . . . . . . . . . gr. x
Syr. Zingib . . . . . . . . . . f ʒij
Aquæ ad . . . . . . . . . . f ℥ij
M. ft. Solutio.
S. A teaspoonful every three hours.

℞ Ferri et Quin. Cit. . . . . . . . . . .
Ammon. Carb. . . . . . . . . . aa ʒj
Sp. Ammon. Arom. . . . . . . . . . ʒiv
Tinct. Opii . . . . . . . . . . ʒij
Aquæ ad . . . . . . . . . . ℥viij
M. ft. S. One teaspoonful three times a day. A.

*K*—Criticise the following prescriptions. Write out the English names, with ingredients and quantities; state whether you would compound them as written, or what course you would pursue upon receiving them.

℞ Quinin. Sulph. . . . . . . . . . . . . . . . . . . . . . . . gr. j
Ext. Nucis Vomicæ . . . . . . . . . . . . . . . . . . . . gr. v
Morph. Sulph. . . . . . . . . . . . . . . . . . . . . . . . gr. viij
M. ft. pil. No. x.
Sig. One pill every three hours.

℞ Potass. Permang. . . . . . . . . . . . . . . . . . . . . . . . . ʒj
Alcohol . . . . . . . . . . . . . . . . . . . . . . . . . . . . ℥j
Glycerin . . . . . . . . . . . . . . . . . . . . . . . . . . . ℥ij
M. ft.
Sig. Use as directed.

X.

CHEMISTRY.

*A*—(1) What are the native sources of Borax? Give the chemical formulas for *Sodii Boras* and for *Acidum Boricum*. (2) How would you prepare Borax from Boric Acid? (3) How would you prepare Boric Acid from Borax? (4) Give the most characteristic tests, both physical and chemical, for both these compounds.

*B*—(1) Describe the metal Sodium. (2) Give two of the methods used for its production. (3) Give the formulas of *Sodii Chloridum*, *Sodii Chloras*, *Sodii Hyposulphis*, *Sodii Phosphas*, and *Sodii Hypophosphis*. (4) What are the analytical tests for Sodium and its Salts?

*C*—(1) What are the chief ores of Zinc, and how is the metal obtained from them? Describe the metal, and enumerate its properties, both physical and chemical. (3) Mention the uses of Zinc, and state which alloys of it are of practical value. (4) Give the names and formulas of the official Salts of Zinc.

*D*—(1) Give the formula of *Acidum Chromicum*. (2) Give the formula of *Potassii Bichromas*, and of the normal Potassium Chromate, and explain the chemical difference between these formulas. (3) What takes place when an excess of Sulphuric Acid is added to a concentrated aqueous solution of Potassium Bichromate? (4) What takes place when an alkaline hydrate solution is added to a solution of *Potasii Bichromas?* (5) What pigments may be formed from Potassium Bichromate?

*E*—(1) Write the chemical formulas of—*Ferri Chloridum*, *Ferri Oxidum Hydratum*, *Ferri Sulphas*, *Ferri Hypophosphis*, *Potassii Ferrocyanidum*, *Ferri Lactas*. (2) State by what tests Ferrous Salts can be distinguished from Ferric Salts? (3) State how a Ferrous Compound can be converted into a Ferric one?

*F*—(1) Give the general formulas for the Paraffin, the Olefine, and the Benzene series of Hydrocarbons. (2) State the occurrence in nature or conditions of artificial formation of each of these series. (3) How could you distinguish, by chemical tests, between these three series?

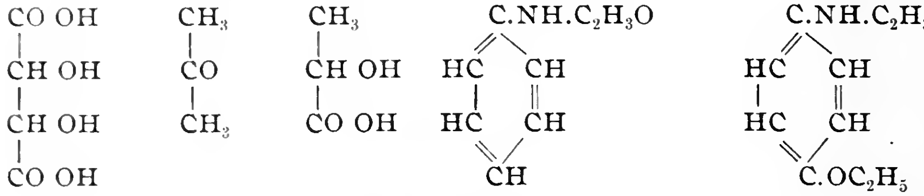
*G*—(1) Name an official compound belonging to the class of Triatomic Alcohols. (2) State the source of the compound and how it is prepared from the naturally occurring products. (3) Write the reaction for its production from one of these snbstances. (4) Name the other products of the reaction just referred to.

*H*—(1) Write the graphic formulas of *Alcohol*, *Chloral*, *Acidum Carbolicum*, *Acidum Benzoicum*, and *Acidum Gallicum*.

*I*—(1) What is Phenol? (2) Name such official compounds as belong to the class of Phenols, and write their graphic formulas. (3) What is a Phenol-Acid? (4) Name such official compounds as belong to the class of Phenol-Acids, and write their graphic formulas.

*K*—(1) Name the compounds indicated by graphic formulas, and where official give both chemical and official names.

(1) (2) (3) (4) (5)



MATERIA MEDICA.

(1) Name and describe the different forms of Proteid that may exist in a cell.

(2) State how a wall of a cell may vary in composition.

(3) What are the distinctive characteristics of Meristem Tissue?

(4) Describe the characteristics of Epidermal Tissue and name its varieties.

(5) Under what circumstances is the Epidermis not cutinized?

(6) Describe the structure and state the use of a Stoma. How are Stomata distributed on the plant?

(7) Describe the usual form or shape of Chloroplast and their mode of increase.

(8) What relation does Chlorophyll bear to Chlorophyll-Bodies, and of what use to the plant is Chlorophyll?

(9) What are Conjoint Fibro-Vascular Bundles?

(10) What kind of bundles are characteristic of the following stems: The Fern, the Lycopodium, the Equisetum, the Monocotyl, and the Dicotyl?

(11) Write such a description of Aconitum as would serve for its certain identification.

(12) Name one of the most important structural characteristics of each of the following drugs: Taraxacum, Senega, Rheum, Cimicifuga, and Cinchona Calisaya.

(13) How, without aid from the senses of taste and smell, may Serpentaria be distinguished from Spigelia?

(14) By what chemical test may Guaiac Wood be readily recognized?

(15) By what simple test may chips of Red Saunders be readily distinguished from those of Logwood?

(16) By what simple means may Granatum be easily distinguished from other drugs?

(17) Name three official barks which are destitute of bast-fibers.

(18) Name three official barks that consist of the inner layer only.

(19) In the botanical classification of fruits, to what group do each of the following belong: Colocynth, Prunum, Fœniculum, Piper Nigrum, and Cardamomum?

(20) Name three official seeds that are albuminous and three that are exalbuminous.

(21) Write the botanical name and natural order of Crocus, and state what part of the plant is official.

(22) Name an acid and three important alkaloids found in Opium. Name an acid and three important alkaloids found in Cinchona.

(23) Write the botanical name and natural order of the plants from which each of the following drugs is derived: Elaterium, Manna, Opium, Guarana, and Zea,

(24) Name the source of each of the following alkaloids: Thebaine, Emetine. Pelosine, Chelerythrine, Cornutine, Menispine, and Hygrine.

(25) Name the source of each of the following non-alkaloidal principles: Meconic Acid, Rottlerin, Chrysophan, Cathartic Acid, Saponin, Elaterin, and Rhamnoxanthin.

(26) Name five official drugs that are powerful hydragogue cathartics.

(27) Name three powerful drugs that act as tonics to the heart, strengthening its beat; and three that powerfully depress the heart's action.

(28) Define the terms Cholagogue, Antiseptic, Antiperiodic, Mydriatic, and Anthelmintic.

(29) What are the most marked symptoms of opium poisoning, and what treatment is indicated?

(30) Name two powerful official drugs which, in medicinal doses, stimulate the respiratory function.

COMMITTEE.

*A*—(1) A solid body weighs 50 ounces in the air and 30 ounces in water. What is its specific gravity? (2) What is the volume of the body? (3) What is the weight of an equal volume of water? (4) What would it weigh if it were immersed in official Glycerin? (5) If two avoirdupois pounds of official Sulphuric Acid were poured into a measure graduated to show fluid ounces, to what number would it be filled?

*B—Asafœtida.* (1) Give botanical name, natural order, and habitat of the plant which yields Asafœtida. (2) Describe the characteristics of the natural order to which the plant belongs. (3) What appearance does the drug present in commerce? (4) Why does it form an emulsion when mixed with water? (5) What are its chief constituents, and to what is its odor due? (6) Name three official preparations of Asafœtida. (7) Give the dose of Asafœtida.

*C—Materia Medica.*—Belladonna Root. (1) Enumerate the characters by means of which Belladonna Root may be distinguished from any other official root. (2) What is the important alkaloid of Belladonna? (3) What is the most characteristic constitutional effect of Belladonna or of its alkaloid? (4) What is the dose of Belladonna Root? (5) Name the official drugs which in physiological action are closely related to Belladonna. (6) Why is the official name *Belladonna Radix* and not *Belladonna?*

*D*—(1) Name five official Fixed Oils, giving the Latin and English titles. (2) Describe briefly the processes for making the fixed oils of commerce used medicinally. (3) Name five official volatile oils, giving both Latin and English titles. (4) Describe briefly three processes by which volatile oils are procured.

*E*—(1) Give Symbol, Equivalence and Atomic Weight of the metal Magnesium. (2) What two kinds of Magnesium Oxide are official, and how is each made? What is the essential difference in chemical reaction with water between the two? (3) Which variety of Magnesium Carbonate is the official? (4) Give the chemical reactions that take place in making Liquor Magnesii Citratis.

*F*—(1) Give the antidotes for the following poisons: Arsenic, Corrosive Sublimate, Oxalic Acid. (2) What antidote would you administer for a corrosive liquid of unknown identity? (3) For what class of poisons are antidotes usually unavailing? In such cases how may the patient's life be saved?

*G—Strophanthus.* (1) Give its official name; botanical name. (2) To what region is it indigenous? (3) What is the active principle of Strophanthus? (4) What is the dose of Strophanthus? (5) What preparation of Strophanthus is official? (6) Give the dose of this preparation. (7) What are the medical properties of Strophanthus?

*H*—The molecular weight of *Crystallized Alum* is 946.46, and that of *absolutely dry Sodium Carbonate* is 105·85. How much of the Sodium Carbonate would be required for one kilogramme of Alum in the manufacture of *Aluminum Hydrate?*

*I*—Complete prescription No. 1 by inserting the quantities of the several ingredients, the patient being an adult and suffering from a mild dropsical condition.

Write out, in an unabbreviated form, what you would dispense in prescription No. 2.

1.

℞ Potass. Acetat. . . . . . . . . . . . . . . . . . . . . . . . . .
Infus. Digitalis . . . . . . . . . . . . . . . . . . . . . . . .
Ext. Tritici Fluid . . . . . . . . . . . . . . . . . . . . . . .
Spt. Æther Nit . . . . . . . . . . . . . . . . . . . . . . . . .
Infus. Buchu . . . . . . . . . . . . . . . . . . . . . . . . . .
M. Sig. Take a tablespoonful three times a day for four days.

2.

℞ Pot. Chlor. . . . . . . . . . . . . . . . . . . . . . . . . . ʒj
Aq. Chlor. . . . . . . . . . . . . . . . . . . . . . . . . . . f℥iv
Spt. Syr. Nig. . . . . . . . . . . . . . . . . . . . . . . . . f℥ij
Syr. Zingib. . . . . . . . . . . . . . . . . . . . . . . . q. s. ad ℥viij
M. Sig. Tablespoonful every two hours until relieved.

*K*—(1) Write a metric prescription for 100 pills, each to contain one-eighth grain Morphine Sulphate, one-sixtieth grain Strychnine Sulphate, and one twelfth grain Arsenous Acid, with the quantity of a suitable excipient, expressed metrically, to make one-grain pills.

(2) Translate the following prescription, giving the equivalents in apothecary's system:

GERMAN PRESCRIPTION.

℞ Chloroform . . . . . . . . . . . . . . . . . . . . . . . 50.
Ætheris . . . . . . . . . . . . . . . . . . . . . . . . . 60·
Ol. Sesami . . . . . . . . . . . . . . . . . . . . . . . 130·
M. ft. Liniment.
S. Use externally.

SPECIMENS.

The following specimens were placed before the senior students for recognition during the several examinations:

*Pharmacy.*

Aqua creosoti,
Spiritus ætheris nitrosi,
Spiritus ætheris compositus,
Ceratum plumbi subacetatis,
Pulvis ipecacuanhæ et opii,
Extractum sennæ fluidum,
Tinctura benzoini composita,
Syrupus ferri iodidi,
Extractum cinchonae fluidum,
Tinctura calumbæ.

*Chemistry.*

Aqua destillata,
Amylum,
Sodii salicylas,
Naphtalinum,
Sodii bicarbonas,
Sodii acetas,
Saccharum lactis,
Mangani dioxidum,
Potassii nitras,
Benzinum.

*Materia Medica.*

Bryonia,
Stillingia,
Geranium,
Calamus,
Euonymus,
Salvia,
Chenopodium,
Conium,
Physostigma,
Colchici semen.

*Committee.*

Tinctura cardamomi composita,
Linimentum chloroformi,
Extractum ergotæ fluidum,
Extractum gentianae fluidum,
Potassii bicarbonas,
Zinci acetas,
Ammonii chloridum,
Senega,
Guaiaci lignum,
Cascarilla.

OPERATIVE PHARMACY.

(*1*) *Ointment of Mercuric Nitrate.*

| | | |
|---|---|---|
| Mercury | 2·5 | gm. |
| Nitric Acid | 2· | c.c. |
| Nitric Acid | 3· | c.c. |
| Lard Oil | 30· | c.c. |

Make Ointment of Mercuric Nitrate by the official process.

(*2*) *Pills.*

| | | |
|---|---|---|
| Ferric Citrate | 3. | gm. |
| Cinchonine Sulph. | 1. | gm. |
| Oil of Caraway | 15 | Drops. |

Mix; make 15 pills.

Write in English, upon the label, all the ingredients and quantities used in making the pills, and put the label on the bottom of the box.

(*3*) *Suppositories.*

| | | |
|---|---|---|
| Ext. Belladonna Leaves | .50 | gm. |
| Tannic Acid | ·50 | gm. |
| Oil of Theobroma | 6·00 | gm. |

Make 6 suppositories, by rolling.

(*4*) *Prescription.*

Put up a prescription, *secundum artem*, each teaspoonful dose of which shall contain five minims each of Tincture of Guaiac and Spirit of Nitrous Ether, with sufficient water to make two fluid ounces. Write upon a separate label the contents of the bottle, and attach it.

(5) *Plaster.*

Spread a breast-plaster, about 6 inches in diameter. Soap plaster will be found in the dipper.

ANALYTICAL CHEMISTRY.

(*Students of the second-year class were also given this examination.*)

The examination in this branch consisted in the examination of a compound powder for metals and inorganic and organic acids.

VEGETABLE HISTOLOGY.

(*Students of the second-year class were also given this examination.*)

(1) To which of the following plant types does the specimen belong: The Fern, the Monocotyl, the Gymnosperm, or the Dicotyl? (2) Which of the following organs does it represent: a root, the petiole of a leaf, or a stem? Give the reason for your conclusion. (3) Make a diagram of the cross-section and locate such of the following parts as are represented: the epidermis, the periderm, the pith, the cambium zone, a medullary ray, the xylem of a bundle, the endodermis and the pericycle. (4) Enumerate the tissues which you find present. (5) Is starch present? What test did you employ to determine? In what parts of the section is it most abundant? (6) What tissues are lignified? In what part of the section were the lignified tissues most abundant? Describe your method of testing for lignified structures. (7) What varieties of secretion tissue do you find, and how are they distributed? (8) If milk tissue is present, state which variety it represents and how it is distributed. (9) For clearing sections of starch and proteid matters, what reagents may be employed? (10) Suppose you find crystals in a cell, bv what means could you tell whether they are protein crystals or mineral crystals? Having determined that the crystals are inorganic, how could you tell whether they are composed of calcium carbonate or of calcium oxalate?

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## SEVENTY-SIXTH ANNUAL COMMENCEMENT.

The exercises connected with conferring the degree of Graduate in Pharmacy were held at the College Building, Wednesday evening, April 14, at 8 o'clock.

Prayer was offered by Rev. B. L. Agnew, D.D.

President Bullock conferred the degree upon the following:

| *Name.* | *Subject of Thesis.* | *State.* |
|---|---|---|
| Althouse, Harry B., | *Pharmacy journals,* | Pennsylvania. |
| Anderson, Ralph Samuel Lloyd, | *Progress in pharmacy,* | Pennsylvania. |
| Baker, Newton Claire, | *Arsenic and its preparations,* | Pennsylvania. |
| Bartholomew, Claude Lafayette, | *Antipyrine,* | Pennsylvania. |
| Bates, John Phillips, | *Liquor potassæ et liquor sodæ,* | Pennsylvania. |
| Breithaupt, Alphons Peter, | *Structure of leptandra,* | Pennsylvania. |
| Brumbaugh, Albert Sylvester, | *Digestive value of Carica papaya,* | Ohio. |
| Clapp, Samuel Clarence, | *Kola nut,* | Pennsylvania. |
| Clark, Edward B., | *Glycerinum,* | Pennsylvania. |
| Cloud, Norman Henderson, | *Copaiba,* | Pennsylvania. |
| Codori, Simon Jacob, Jr., | *Cinchona bark,* | Pennsylvania. |
| Compton, Richard Hal, | *Valuation of liquor iodi compositus,* | Texas. |
| Cooper, Morris, | *Testing in retail pharmacies,* | Pennsylvania. |

| *Name.* | *Subject of Thesis.* | *State.* |
|---|---|---|
| Cope, Edward Kreidler, | *Opium and its uses,* | Pennsylvania. |
| Criswell, Edward Ott, | *Cascara sagrada,* | Pennsylvania. |
| Deibert, William Henry, | *Tasteless Cascara sagrada compounds,* | Pennsylvania. |
| Eschbach, Clarence Derbie, | *Syrupus acidi hydriodici,* | Pennsylvania. |
| Farley, Levi James, | *Vegetable histology,* | Pennsylvania. |
| Few, Colin Spangler, | *Olive oil,* | Pennsylvania. |
| Garrison, Joseph Miller, Jr., | *Value of pharmacognosy,* | New Jersey. |
| Gessford, Otice Eugene, | *The pharmacists,* | Pennsylvania. |
| Godfrey, Swain Townsend, | *Coal,* | New Jersey. |
| Godshall, Samuel R., | *Acidum aceticum dilutum,* | Pennsylvania. |
| Goodfellow, Charles Rumney, | *Pharmacists and their imitators,* | Pennsylvania. |
| Gross, Paul Herbert, | *Olive oil and its production,* | Pennsylvania. |
| Harry, Hamilton Maxwell, | *Camphor,* | Pennsylvania. |
| Heim, Christian, | *Liquor plumbi subacetatis,* | Pennsylvania. |
| Hildebrand, Howard Ovid, | *Coca,* | Pennsylvania. |
| Hörst, Harry Lewis, | *The pharmacy of brewing,* | Pennsylvania. |
| Howell, Harry Field, | *Cocaine,* | Pennsylvania. |
| Hukill, Oscar K., | *Pharmaceutical education,* | Arkansas. |
| Ingling, Howard Edgar, | *Cinchona,* | New Jersey. |
| Jefferis, David Strode, | *Opium,* | Pennsylvania. |
| Jennings, Isaac Astor, | *The relation of the druggist to the physician.* | Virginia. |
| Johns, Frank James, | *Koumys,* | Pennsylvania. |
| Kessler, Lawrence Anthony, | *Assay of spiritus ætheris nitrosi,* | Ohio. |
| Kirlin, Charles Coleman Hagenbuch, | *Attar or otto of rose,* | Pennsylvania. |
| Kramer, George Henry, | *Syrupus ferri iodidi,* | Pennsylvania. |
| Laughlin, Albert Russell, | *Gossypium herbaceum,* | Pennsylvania. |
| Lenhart, Enos Samuel, | *Sulphuric acid,* | Pennsylvania. |
| Levan, Walter, | *Ergot,* | Pennsylvania. |
| Lewis, Daniel William, | *Opium,* | Pennsylvania. |
| Liebert, Charles Frederick, | *Concentrated infusions,* | Pennsylvania. |
| Longshaw, Thomas Elmer, | *Poisons and their antidotes,* | Pennsylvania. |
| Luhr, Frederick A., | *Cascara sagrada,* | Pennsylvania. |
| Lukens, Charles Baker, | *Hydrogen dioxide,* | Pennsylvania. |
| McGehee, Hanford Bell, | *Ointments,* | Virginia. |
| McNeil, Thomas Hunter, | *Kola,* | Pennsylvania. |
| Matusow, Harry, | *Kalmia latifolia,* | Russia. |
| Metzler, Claude Dallas, | *Belladonna,* | Pennsylvania. |
| Morgan, Clayton Edward, | *Adulteration,* | Massachusetts. |
| Mueller, Charles August, | *Abstracts,* | Pennsylvania. |
| Nebel, Charles William, | *Ointments and cerates,* | Pennsylvania. |
| Parry, Edward, | *Powdered extract of licorice,* | Wales. |
| Parry, William Hough, | *Medicated waters,* | Pennsylvania. |
| Pearce, Samuel Robert, | *Camphor,* | New Jersey. |
| Peiffer, Charles Oscar, | *Acacia,* | Pennsylvania. |
| Praul, Walter Francis, | *Rheum,* | Pennsylvania. |
| Punt, Arnold Anthony Joseph, | *Density of solutions,* | Pennsylvania. |
| Reese, John Bull, | *Cinchona,* | Pennsylvania. |
| Rieben, Ernest, | *Stramonium,* | Pennsylvania. |

| *Name.* | *Subject of Thesis.* | *State.* |
|---|---|---|
| Roth, Frans Johan | *Arsenic and its compounds,* | Sweden. |
| Seipel, Harry Bertram, | *Zingiber,* | Pennsylvania. |
| Smiley, Laura Marguerite, | *Podophyllum,* | Pennsylvania. |
| Stommel, Henry Aloysius, | *Liquorice in pharmacy,* | Pennsylvania. |
| Streeper, Austin, | *Cinchona barks,* | Pennsylvania. |
| Tobias, Isaac Herbert, | *Preservative for syrup of ferrous iodide,* | Ohio. |
| Troxell, John Isaac Peter, | *Ergot,* | Pennsylvania. |
| Weitzel, Sue C., | *Veratrum viride,* | Pennsylvania. |
| Wentzler Hartman Gotthard, | *Percolation of every tincture of U.S.P.,* | Pennsylvania. |
| Wetzel, Samuel, | *Belladonna,* | Pennsylvania. |
| Wilson, Oliver Fawcett, | *Solid extracts by acetic acid,* | Pennsylvania. |
| Winger, John Bowman, | *Gelatin capsules,* | Pennsylvania. |

STATES AND COUNTRIES REPRESENTED BY THE GRADUATING CLASS.

| | | | | | |
|---|---|---|---|---|---|
| Arkansas | 1 | Pennsylvania | 58 | Virginia | 2 |
| Massachusetts | 1 | Russia | 1 | Wales, | 1 |
| New Jersey | 4 | Sweden | 1 | | — |
| Ohio | 3 | Texas | 1 | Total, | 73 |

Special certificates for a two years' course in general, applied and analytical chemistry were awarded to:

Bertha Leon DeGraffe, New York.
Freeman Preston Stroup, Pennsylvania.
S. Allen Tucker, Pennsylvania.
Wm. Clements White, Pennsylvania.

The degree of Master in Pharmacy was conferred on the following:

Virgil Coblentz, New York.
John Uri Lloyd, Ohio.
Charles T. George, Pennsylvania.
Jacob H. Redsecker, Pennsylvania.
Lucius Elmer Sayre, Kansas.

The following members of the class attained the grade of Distinguished:

Albert Sylvester Brumbaugh.
Harry Matusow.
Clayton Edward Morgan.

AWARD OF PRIZES.

The Maisch Memorial Prize of a Zentmayer microscope, offered by the family of the late Professor Maisch, for original histological work on American plants, was awarded to Alphons Peter Breithaupt.

The William B. Webb Memorial Prize, consisting of a gold medal and certificate, for the highest general average in operative pharmacy, specimens and committee examinations, offered by Mrs. Rebecca T. Webb, was awarded to Albert Sylvester Brumbaugh.

The Chemical Prize of $25 in gold, offered by Prof. Samuel P. Sadtler, for original quantitative analysis, was given to Harry Matusow. The following

graduate received honorable mention in connection therewith: Lawrence Anthony Kessler.

The AMERICAN JOURNAL OF PHARMACY Prize of $25, offered by Prof. Henry Trimble, for a paper (not intended for a thesis) involving original work in the Chemical Laboratory, was awarded to Harry Matusow.

The John M. Maisch Prize of $20 in gold, offered by Mr. J. H. Redsecker, of Lebanon, Pa., for histological knowledge of drugs, was awarded to Claude Dallas Metzler, with honorable mention of John Phillips Bates and Albert Sylvester Brumbaugh.

The Operative Pharmacy Prize of $25 in gold, offered by Prof. Joseph P. Remington, for the best examination in operative pharmacy, was awarded to Clayton Edward Morgan, with honorable mention of the following graduates: Enos Samuel Lenhart, Alphons Peter Breithaupt, Oliver Fawcett Wilson, Richard Hal Compton and Albert Sylvester Brumbaugh.

The Robinson Chemical Prize of a gold medal and certificate, offered by Mr. James S. Robinson, of Memphis, Tenn., for the best examination in general and analytical chemistry, was awarded to Clayton Edward Morgan.

The valedictory address to the graduating class was delivered by Professor Joseph P. Remington.

The farewell supper of the professors to the graduating class was given in the Museum of the College, Tuesday evening, April 13th. The officers and trustees of the College were present, together with some other invited guests. Professor Remington, as Dean of the Faculty, was master of ceremonies, and after the *menu* was disposed of speeches were made by the President of the College, members of the faculty, some of the trustees, members of the class and invited guests.

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## ALUMNI ASSOCIATION OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The Thirty-third Annual Meeting of the Alumni Association of the Philadelphia College of Pharmacy convened in the Auditorium of the College Building, 145 North Tenth Street, on Monday afternoon, April 12, 1897.

President Dr. J. Louis D. Morison, '88, presided, and called the meeting to order at 2.30 P.M., 22 members being present.

The President read his address, in which he said: "With the close of the exercises attending the reception to the seventy-sixth graduating class to night, we shall have rounded out nearly a third of a century of existence as an active organization; and while the past year has not shown any very conspicuous evidences of activity beyond that of mere routine work, yet I am happy to say we are still quite healthy. Notwithstanding the fact that there has been observed at times slight symptoms of inertia of the interest in the work of the Association which, during the past year has, at times, seemed to flag, I am by no means convinced that she is, therefore, losing her vitality as an organization." He advised the infusion of more new blood into her veins by every member giving to the Association a more lively interest, and he did not share with some the opinion that because the Association has relinquished its interests in the Quizzes it has, therefore, no important work to do. On the contrary, he felt there never was a time in its history when its field for work was larger and more full of promise

than it is to-day, and the advent of the session of 1897–98 will see our College doors thrown open to receive for the first time in her history three distinct classes.

He recommended the publishing of the ALUMNI REPORT twelve times a year, and believed the question was already uppermost in the minds of very many of the active members, and urged the advisability of giving to this important matter early and earnest consideration.

He also advised the holding of the Alumni Social Meetings in the future in the evenings instead of the afternoons, as heretofore.

In closing, he expressed what he believed to be the sense of the meeting, and that was the profound sorrow felt by all at the death of Prof. Edson S. Bastin. "By his untimely departure we sustain the loss of an honored member and the College a valued and distinguished teacher; and while we lament the passing away of Edson S. Bastin, we, at the same time, rejoice that it was our great privilege to have had him in our midst, for, by his genius and indomitable energy, there has been added to our College a microscopical laboratory second to none in any teaching institution in the country—a work that will ever remain a glorious monument to his memory.

The Secretary, Wm. E. Krewson, '69, presented his seventeenth annual report as Secretary, in which he reviewed the work of the Association for the past year, but regretted that the Association had not been more active.

During the year sixty-five members have been added, seven who paid the required fee and fifty-eight who were members of the College Review Quiz Classes.

The membership now numbers 2,749, after deducting those who died during the year, making a net gain of thirty-nine new members for the year.

The report of the Memorial Committee showed that twenty-six of the active members had died during the year; also eleven of our graduates who were not active members.

The Secretary also reported that two of our honorary members had died, viz: First Vice-President Robert Shoemaker and Prof. Edson S. Bastin.

Twenty of the members had procured the Alumni badges during the year, making a total of 285 members who had procured the badge.

The Secretary suggested the dispensing of the Social Meetings altogether or the holding them in the evenings; also to petition the Committee on Property of the Board of Trustees to have the College Museum open every day for the use of the students and pharmacists who might wish to avail themselves of visiting it, and have a suitable person in charge to care for the room and its valuable collections.

He also suggested the publishing of the *Alumni Report* each month in the year.

The Treasurer, Wm. Lincoln Cliffe, '84, reported that he had received from all sources during the year $2,658.83, which, added to the balance in the treasury at the commencement of the year, made a total of $2,925.77. The disbursements amounted to $2,849.37, leaving a balance in the treasury of $76.40.

John Uri Lloyd, of Cincinnati, O.; Dr. Edward Robinson Squibb, of Brooklyn, N. Y., and Dr. Chas. Rice, of New York City, were unanimously elected as honorary members of the Alumni Association.

The following officers were elected for the ensuing year, viz :

President, Harry L. Stiles, '85 ; First Vice-President, James C. Perry, '91 ; Second Vice-President, F. Wm. E. Stedem, '82 ; Treasurer, Wm. Lincoln Cliffe, '84 ; Secretary, Wm. E. Krewson, '69 ; Corresponding Secretary, Theodore Campbell, '93. Board of Directors, for three years : Henry Trimble, '76 ; David H. Ross, '78 ; Wm. N. Stem, '73 ; Dr. J. Louis D. Morison, '88.

John H. Hahn, '81, was elected to fill the vacancy of two years caused by the election of Theodore Campbell, '93, as Corresponding Secretary. The present Recording Secretary, Wm. E. Krewson, was re-elected for the eighteenth time.

The Thirty-third Annual Reception to the seventy-sixth graduating class was held on the evening of the same day in the College Auditorium, and was one of the most successful ever held. The hall was beautifully decorated with the College colors and the American flag.

An interesting concert programme was rendered by Bastert's Parlor Orchestra. The President, Dr. J. Louis D. Morison, presided, and made a few introductory remarks and welcomed the new members.

The Secretary called the roll of those elected during the year.

The annual class oration was delivered by Howard Ovid Hildebrand of York, Pa.

The reciting of the poem dedicated to the seventy-sixth graduating class was rendered by Samuel R. Godshall, of Soudertown, Pa.

Samuel Clarence Clapp, Jr., of Milton, Pa., gave the history of the Class of 1897, and Harry Lewis Hörst, of Lock Haven, Pa., foretold the future of the Class of 1897.

The Alumni gold medal was presented to Clayton Edward Morgan, of Philadelphia, Pa., a son of our fellow member of the Alumni Association, Frank E. Morgan, of the Class of '81 ; and it was presented in a very pleasing manner by Dr. Clement B. Lowe, '84. The eight prize certificates for the highest general average in each of the branches were awarded to the following students, viz. :

CERTIFICATES.

Pharmacy—John Phillips Bates, Mansfield, Pa.

Chemistry—Walter Francis Praul, Philadelphia, Pa.

Materia Medica—Harry Matusow, Minsk, Russia.

General Pharmacy (Committee)—Samuel Robert Pearce, Manasquan, N. J.

Operative Pharmacy—Oliver Fawcett Wilson, Pittsburg, Pa.

Analytical Chemistry—Albert Sylvester Brumbaugh, Mansfield, O.

Pharmacognosy (Specimens)—Claude Dallas Metzler, Harrisonville, Pa.

Microscopy (Vegetable Histology) – Miss Laura Marguerite Smiley, Philadelphia, Pa.

The Testimonial Prize certificates to the undergraduates receiving the highest general averages in the first- and second-year class examinations were awarded to Melvin William Bamford, of the first-year class, of Reading, Pa., and to George Carll Keen, of Vineland, N. J., of the second-year class.

The last named certificate was awarded for the first time this year, it being the first examination for second course students under the new curriculum.

W. E. K.

# MINUTES OF THE ANNUAL MEETING OF THE COLLEGE.

The annual meeting of the members of the College was held March 29, 1897. Wm. J. Jenks, Second Vice-President, presided. The minutes of the meetings of the Board of Trustees for January, February and March were read and adopted.

The next in order was the presentation of the annual reports of officers and permanent committees.

The following was submitted by the Editor of the AMERICAN JOURNAL OF PHARMACY:

This report covers the issues from April 1, 1896, to March 1, 1897, inclusive. During that time there have been published 708 pages of reading matter, an increase over that reported last year of 66 pages; the average for each of the twelve numbers being 59 pages against an average of 53½ pages last year. This is the greatest number of pages ever issued by the JOURNAL in one year.

The number of original papers published during the year was 83, an increase of nine over last year; these occupied 397 pages, against 374, 297 and 159 in each of the immediately preceding years. These papers were prepared expressly for the JOURNAL, and the number given does not include those read before other societies, abstracts, translations or editorials.

The number of authors contributing were 51, of whom 16 were members of the College and 35 were non-members.

Illustrations were published in every number of the JOURNAL, and amounted to a total of 89 during the year, making an average of 7·4 for each issue, against a total of 76 last year, averaging 6·3 for each issue.

No difficulty has been experienced during the year in securing original matter for publication; in fact the more serious question has been, how to utilize all that is offered without considerably enlarging the size of the JOURNAL. The latter alternative may be better considered in connection with the Report of the Committee on Publication.

The Publication Committee reported the regular issue of the JOURNAL during the year. There was a gain in the number of new subscribers, and the character of these was such as to give decided encouragement to the committee. The financial part of the report was likewise gratifying in character.

The following was presented by the Librarian:

PHILADELPHIA, March 29, 1897.

The Librarian respectfully reports that, during the past year, there have been added to the library 440 volumes, besides the various periodicals which are received in exchange for the AMERICAN JOURNAL OF PHARMACY. There has been expended $430.71 for books, and for binding, $68.90.

The library has been consulted by very many of our students, and by several parties who were referred to our books for information not to be found elsewhere.

T. S. WIEGAND, *Librarian.*

The Curator submitted the following:

PHILADELPHIA, March 29, 1897.

*Philadelphia College of Pharmacy.*

GENTLEMEN:—Your Curator would respectfully report that the Museum is in a good condition and has received a number of valuable accessions during

the year. Among those who contributed were Prof. J. W. Toumey, of the University of Arizona; Mr. J. H. Maiden, of Sydney, New South Wales; Prof. Alfonso Herrera, of Mexico; Mr. J. Bosisto, of Melbourne, Australia, and Mr. E. M. Holmes, of the Pharmaceutical Society of Great Britain.

The need exists for more shelf room in the Museum, and this will be imperatively required, if a certain promised collection of drug products—which is extensive and valuable—is secured.

There is another matter that should be referred to. While the College is rich in its splendid herbarium, in its collection of plants and plant-products, in its collection of chemical and pharmaceutical products, it lacks one thing, and that is a collection of minerals representing the origin of the elements and of the inorganic chemical compounds—not a geological collection, but a collection of raw material—so to speak—that will exhibit to the pharmaceutical student the primary source of his elements and inorganic chemical compounds. Such a collection need not be very expensive, and would add much to the value of the Museum. Your Curator would therefore respectfully suggest that, as soon as the condition of the treasury will permit, that such a collection be bought. I am,

Yours respectfully,

J. W. ENGLAND, *Curator.*

The various reports having been presented and accepted, the next matter of business was the annual election of officers. The death of Mr. Robert Shoemaker having left void the office of First Vice-President, the order of succession was accorded to Mr. William J. Jenks, Second Vice-President, and he was thereupon elected to the position made vacant by Mr. Shoemaker's death. Mr. Howard B. French having been elected to succeed Mr. Jenks as Second Vice-President, the total number of officers elected was as follows:

President, Charles Bullock; First Vice-President, William J. Jenks; Second Vice-President, Howard B. French; Treasurer, James T. Shinn; Corresponding Secretary, Dr. A. W. Miller; Recording Secretary, William B. Thompson; Librarian, Thos. S. Wiegand; Curator, Jos. W. England; Editor, Prof. Henry Trimble; Publication Committee, Henry N. Rittenhouse, et. al., Editor H. Trimble, *ex-officio;* Trustees for Three Years, Wallace Procter, Gustavus Pile, W. Nelson Stem; Trustees for Unexpired Terms, F. W. E. Stedem, Richard M. Shoemaker.

As the annual meeting of the American Medical Association will be held in Philadelphia in June, Professor Remington moved that an invitation be extended to the Association to hold the sessions of the section on Materia Medica at this College, and it was so ordered.

On motion, the meeting adjourned.

WILLIAM B. THOMPSON, *Secretary.*

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, April 20, 1897.

The regular Pharmaceutical Meeting of the present series was held in the Museum of the College at 3.30 P.M. Dr. C. B. Lowe presided. The minutes of the previous meeting were allowed to stand as published.

The first paper presented was on "Observations on Some Recent Suggestions Concerning Ointment of Mercuric Nitrate," by Charles H. LaWall. This paper furnished the occasion for an interesting discussion, during which several important practical points were brought out.

In reference to the permanence of Citrine ointment, Mr. F. W. E. Stedem said that he had kept it for more than six months without any apparent change having taken place. He also remarked that by thorough oxidation of the oil previous to the addition of the mercuric nitrate solution, granulation, which so often occurs, was prevented.

Mr. LaWall believed that the variability in quality of this ointment was largely due to difference in manipulation. He also spoke in reference to its keeping quality, and said that this property was enhanced by heating the mixture after addition of the mercuric nitrate solution, until effervescence ceased.

The next paper, which was on a comparative analysis of the root, rhizome and stem of "Gelsemium," by L. E. Sayre, was read by T. S. Wiegand. The results showed that the constituents upon which the therapeutic value of the drug depends were not present in the stem, and the author, therefore, concluded that an admixture of this part of the plant must reduce the value of the drug.

With reference to the use of gelsemium as a remedial agent, Mr. W. L. Cliffe said that other drugs possessing similar properties appeared to be more frequently prescribed.

Dr. Lowe considered it valuable in cases of facial neuralgia, but did not favor its use where aconite was indicated.

An interesting contribution on "The Presence of Starch and Strontium Sulphate in Opium and their Influence on Assaying," prepared by Lyman F. Kebler and Charles H. LaWall, was read by the former.

The authors stated that starch had been found in opium in a number of instances, they themselves having found wheat starch in opium assayed during the past two years. The amount found by them varied from a trace to 8 per cent. But as this substance does not influence the results in assaying they questioned whether or not it could be regarded as an adulterant in the true sense of the word, since the only requirement for opium is that it shall contain a certain amount of morphine.

A matter for more serious consideration was the presence of strontium sulphate in opium, which substance, even in the most carefully conducted assays, according to the U.S.P. method, was found to increase the percentage of crude morphine.

For correcting the results the authors recommeded the ash method as probably being the best, considering the present impurities in opium.

In addition to the consideration of the papers, a number of subjects possessing particular interest for the retail pharmacist were presented for discussion, and altogether the meeting was one of the most profitable of the present series.

On motion, the meeting adjourned.

THOS. S. WIEGAND,
*Registrar.*

# THE AMERICAN JOURNAL OF PHARMACY

*JUNE, 1897.*


## THE ROOT OF PHYTOLACCA DECANDRA.

### A Contribution to the Knowledge of its Chemical Constituents.

PART II.

By George B. Frankforter and Francis Ramaley.

This plant was recorded as emetic by Griffith,[1] in 1833, and as cathartic by Allen[2] the following year. The latter writer remarks that it is difficult to administer without producing emesis, and that large doses are followed by narcotic symptoms.

The earliest record of chemical investigation, found by the writers, that would seem to be of present interest, is by C. Reichel.[3] He studied the pharmacology, therapeutical properties and chemical composition of the root of Phytolacca drastica, a Chilean species, but related to our own. Of organic substances there were found: resin, wax, coloring matter, proteids and malates.

E. Donelly,[4] in 1844, published an analysis of Phytolacca decandra. This is interesting because it is the first analysis of which any record could be found. The following is a summary of the results:

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[1] *Griffith, R. E.* On the Vegetable Emetics of the United States. Jour. Phila. Coll. of Pharm., 4, 276, 1833.

[2] *Allen, John C.* Remarks on the Vegetable Cathartics of the United States. Jour. Phila. Coll. of Pharm., 5, 205, 1834.

[3] *Reichel, C.* Phytolacca Drastica. *Chem. Centrbl.*, 681, 1836.

[4] *Donelly, E.* On Phytolacca Decandra. Am. Jour. Pharm., 9, 165, 1844.

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|---|---|
| Woody fibre | 66·500 |
| Starch | 20·000 |
| Tannin, gum and saccharine matter | 5·375 |
| Gum resin | 2·625 |
| Potassa | 2·000 |
| Iron | ·875 |
| Fixed oil | ·500 |
| Silica and carbonaceous matter | 1·000 |
| | 98·875 |

In the *Chem. Centrbl.* for 1849 a short note states that, according to Landerer,[5] all parts of the Phytolacca decandra, when fresh, have an emetic and purgative effect, which disappears on cooking. In Greece the young shoots and leaves are eaten as greens. They are employed as a vermifuge.

An account by C. H. Cressler[6] records the fact that the inhalation of the powdered root produces soreness of the throat and chest, severe coughing and inflammation of the eyes.

Terreil,[7] in 1880, described phytolaccic acid which he obtained from the fruit of P. decandra and P. Kaempferi. The acid is uncrystallizable and dries without alteration. It forms a translucent, gummy syrup, yellow-brown in color, not deliquescent; easily soluble in water and alcohol, scarcely in ether. The watery solution has an acid reaction. It can be heated to boiling without change, but on addition of hydrochloric or sulphuric acid, is converted into a gelatinous mass, easily soluble in weak alkalies, ammonia, etc.

Balland examined the berries of P. dioica. He determined the percentages of water, wax, sugar, gum, etc. There was 2 6 per cent. of an organic undetermined acid, which was thought to be similar to the phytolaccic acid of Terreil.

Wm. F. Pape[8] found in the root of P. decandra a dark-brown fixed oil, tannin, gum, starch, sugar, resin, organic acid and coloring matter. The ash contained potassium, iron, calcium, chlorine, sulphuric and phosphoric acids. Crystals of potassium nitrate were obtained from an alcoholic extract of the root. Tests with iodo-hydrargyrate

[5] *Landerer.* (Quoted in an editorial note.) Phytolacca Decandra als Heilmittel. *Chem. Centrbl.*, 831, 1849.

[6] *Cressler, Chas. H.* Poke Root. Poisonous effects from inhalation of the powder. AM. JOUR. PHARM., 47, 196, 1875.

[7] *Terreil, A.* *Comptes rendus*, 91, 856-58, 1880.

[8] *Pape, Wm. F.* On Phytolaccæ Radix. AM. JOUR. PHARM., 53, 597, 1881.

of potassium and with iodine solutions indicated the probable presence of an alkaloid.

W. Cramer[9] found the juice of the berries to contain gum, sugar, malic acid and coloring matters.

An elaborate investigation of the root was made by Edmond Preston, Jr.[10] He found traces of hydrochloric, phosphoric and sulphuric acids, with 5·5 per cent. of potassium hydroxide. A small amount of free acid was found; this had the characteristic odor of the root; its potassium salt was decomposed with effervescence on treatment with acids. From the purified aqueous extract of the root there was obtained a small quantity of nearly white crystals, which in solution gave precipitates with the usual alkaloidal reagents. The crystals were entirely dissipated when heated on platinum foil, and when treated with strong mineral acids simply dissolved, giving no characteristic color test. "An alcoholic solution of the crystals neutralized with dilute hydrochloric acid on concentration yielded nearly colorless acicular crystals, moderately soluble in alcohol, quite soluble in water and possessing a strong, acrid taste." It was concluded that the crystals were those of an alkaloid and of its hydrochloride. For this alkaloid the name "phytolaccine" was proposed.

Coscera[11] found that tender shoots and leaves show slight, and the roots more, toxic qualities. The same parts of the plant, at time of fruiting, have a marked emetic and purgative action. He obtained what he considered a glucoside by the following means: The root was extracted by 90 per cent. alcohol; the filtrate, on cooling, showed the substance as a white powder, insoluble in ether, scarcely in absolute alcohol, somewhat in 50 per cent. alcohol, readily in water. It was also soluble in dilute acids. The substance reduced alkaline copper sulphate only after heating with dilute sulphuric acid.

In an alcoholic extract of the root "a few crystals" were found by Partee,[12] but these were not investigated. He also obtained some

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[9] *Cramer, Walter.* Phytolacca Baccæ. AM. JOUR. PHARM., 53, 598, 1881.

[10] *Preston, Edmond, Jr.* The Root of Phytolacca Decandra, Linné. AM. JOUR. PHARM., 56, 567, 1884.

[11] *Coscera, N.* Beiträge zur chemische-toxische-Kentniss von Phytolacca Decandra. L. Review in *Chem. Centrbl.*, pp. 576, 643, 808, 1887.

[12] *Partee, Wm. A.* Analysis of Poke Root. AM. JOUR. PHARM., 60, 123, 1888.

acicular crystals from the absolute alcohol extract. The residue from the ether extract contained a wax, melting at 109°. The other substances found were: gum, glucose and tannin, with indications of a possible glucoside.

The investigations of Haverland[13] were directed to the fruit of Phytolacca. This investigator found phytolaccic acid, with small quantities of acetic, citric and tartaric acids. Phytolaccin, which he found in seeds on analysis, was found to be a non-nitrogenous body related to the tannins, and containing 65 95 per cent. of carbon, 28·15 per cent. of hydrogen, and 5·9 per cent. of oxygen.

A substance obtained from the root, and suggested as being a saponin, was described by Trimble[14] in 1893. It was precipitated by water from the alcoholic percolate. Solutions frothed on shaking. The taste was slightly bitter and acrid. Analysis indicated the formula $C_{54}H_{82}O_{23}$.

The latest contribution to a knowledge of the chemical properties of the root is by one[15] of the present authors. A complete quantitative analysis of the ash was made, and the gases given off during destructive distillation of the root were investigated. As the results have been so lately published it is unnecessary to summarize them here.

In the foregoing account reference has been made to investigations on the fruit of Phytolacca only when it seemed that these might throw light upon the constituents of the root. It will be sufficient here to mention the investigations of Bischoff[16] and Macagno,[17] which were directed to the coloring matter of the fruit, and those of Claussen[18] on the active principle of the seed; and of Eberhardt,[19] who examined the root but made no quantitative analysis and whose work was mostly corroborative of previous results.

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[13] *Haverland, Franz.* Beiträge zur Kentniss der in den Früchten von Phytolacca Decandra enthaltenen Bestandtheile. Inaug. Dissertation. Erlangen. 1892.

[14] *Trimble, Henry.* A Proximate Principle from Phytolacca Decandra. AM. JOUR. PHARM., 65, 273, 1893.

[15] *Frankforter, Geo. B.* A Chemical Study of Phytolacca Decandra. AM. JOUR. PHARM., 69, 134, 1897.

[16] *Bischoff, H.* Inaug. Dissertation. Tübingen, 1876. Ueber den Farbstoffe, etc. Landwirthsch. Versuchsst., 23, 456-61, 1878.

[17] *Macagno, J.* In atti R. Stazione chemico-agraria di Palermo, 47, 1886. *Chem. Centrbl.*, 123, 1886.

[18] *Claussen.* In Husemann-Hilger's "Pflanzenstoffe," p. 531, 1882.

[19] *Eberhardt, E. G.* Chemical Examination of Poke Root. *Lilly's Bulletin*, No. 23, p. 3. 1893.

It is to be noted that the "phytolaccin" of Claussen was described five years before the "phytolaccine" of Preston. Should the latter's discovery be confirmed, it would be necessary to rename the substance described by him.

The authors desire, at this point, to express their thanks to Mr. C. P. Berkey, instructor in mineralogy at this University, for his careful examination of the sugar crystals, and to Dr. Wm. Trelease and Mr. John S. Wright, for assistance in securing the literature on the subject.

RECORD OF INVESTIGATIONS.

The work of investigation was begun in October, 1895, and has been carried on more or less continuously since that time. Two proximate analyses were made. Besides these, various quantities of the root were extracted in different ways for certain of the constituents. Three partial analyses were also made. Air-dried material was used. This was obtained from three different wholesale houses and personally garbeled before grinding. The latter process is an extremely unpleasant task when done with a hand-mill, for the inhalation of the dust produces, as has been noted in the historical summary, most severe inflammation of the membranes of the nose and throat.

Most of the substances previously reported were found in the present investigation. Preston's phytolaccine was, however, not obtained, nor could the presence of tannin or of chlorides be shown. The crystallized sugar which was found is undoubtedly the "glucoside" of Coscera and the "few crystals" of Partee. The "acicular crystals" of the latter were probably potassium nitrate. The large amount of potassium in the root is easily recognized. Its characteristic flame is observed when a splinter of the root is held in the Bunsen flame.

The percentages extracted by the various solvents were as follows:

| | |
|---|---|
| Petroleum ether | ·627 |
| Sulphuric ether | ·100 |
| Absolute alcohol | 11·734 |
| Cold water | 25·232 |
| Dilute sulphuric acid | 38·386 |
| Dilute alkali | 4·744 |
| Removed by potassium hypobromite | 3·206 |
| Residue of cellulose | 16·378 |
| | 100·407 |

Great care was taken that the extraction by each solvent should be complete. The petroleum ether extract was of light amber tint; the ether extract was of a burnt sienna color, and probably contained little else than coloring matter. All the other extracts were of about the same rich reddish-brown tinge. The water extract showed an acid reaction.

A summary of the analyses may be given in tabulated form. When two or more determinations have been made the results have been averaged:

| | |
|---|---|
| Oil and wax | ·627 |
| Resin | 1·010 |
| Non-reducing sugar calculated as sucrose | 9·457 |
| Reducing sugar calculated as dextrose | ·435 |
| Proteids | 1·944 |
| Amido-compounds (calculated as asparagin) | 1·634 |
| Free acid calculated as formic | ·360 |
| Combined organic acid calculated as potassium formate | 1·891 |
| Starch | 11·677 |
| Calcium oxalate | 6·225 |
| Nitrates calculated as potassium nitrate | 2·408 |
| Cellulose | 16·378 |
| Lignin, etc. | 3·206 |
| Gum, coloring matter, ash, moisture and undetermined | 42·748 |
| | 100 000 |

The oil is non-volatile, of a brownish color and readily saponifiable with cold, fixed alkalies. The wax is light yellow in color. It was not studied. The resin found in the alcohol extract was dark brown in color, and of a very bitter taste.

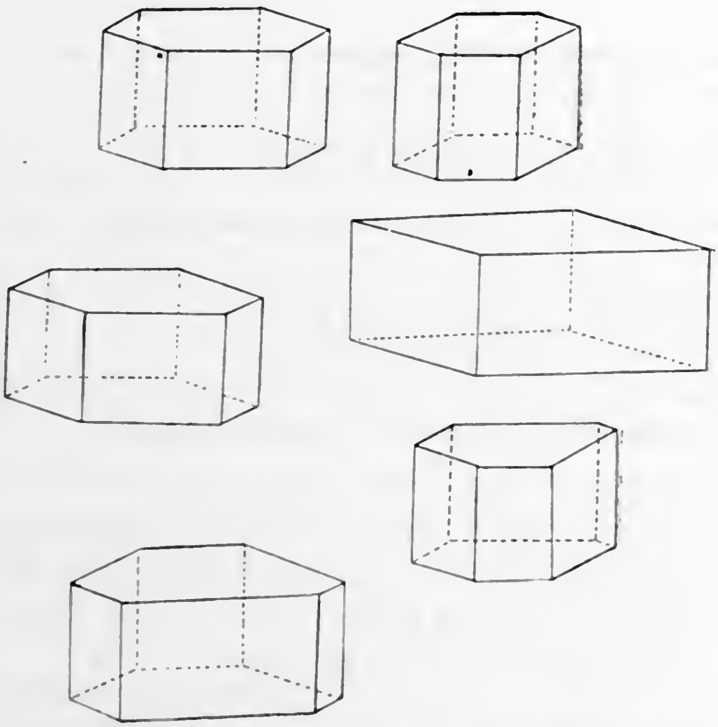
The sugar can only be crystallized with great difficulty and best from absolute alcohol, as the various other substances soluble in alcohols of less concentration seem to interfere with the crystallization. In one analysis 2·6 per cent. of crystallized sugar was obtained. It can generally be had only in much smaller quantities.

This crystallized sugar is completely soluble in large excess of hot absolute alcohol. From such a solution it is sometimes obtained in a very fine crystalline powder. From thick, syrupy water solutions prismatic crystals can, with difficulty, be obtained. These crystals are clear, colorless, transparent prisms, belonging to the orthorhombic system. Their most common forms are represented in the accompanying figure. The longer lateral axis is in nearly all cases cut by pinnacoid planes, so that the crystals, when seen from

above, are almost perfectly hexagonal in outline. The lengths of the lateral axes are 1 and ·767. Since only prismatic crystals were found, the length of the vertical axis could not be determined.

The commonest forms are shown in the accompanying figure.

The sugar began to melt at 146°, and was completely melted at 153°. It boiled at from 180° to 185°, turning brown. Warmed with sodium hydroxid solution, it turned yellow. When warmed with concentrated sulphuric acid, charring did not take place, though there was a brown coloration.



Sugar Crystals from Phytolacca Decandra.

Polarization of a clear solution showed 87·6 per cent. sucrose. The reaction with Fehling's solution indicated 4 4 per cent. anhydrous dextrose. Polarization was not affected by warming the solution nor by allowing it to stand in the tube for some hours.

Proteids were determined in the alkali extract by Kjeldahl's method.

Amido-compounds were determined by the use of potassium hypobromite, the nitrogen evolved measured and calculated to asparagin.

The water extract of the root had a decidedly acid reaction. Two

grammes of the drug were extracted with 200 c.c. of cold water, and the filtered solution titrated against a standard alkali solution. By this means the percentage of free acid, calculated as formic acid, was determined.

On distilling a 90 per cent. alcohol extract of the root a small quantity of the acid was obtained. This was exactly neutralized with fixed alkali and brought to dryness on the water bath. When the alkali was added the solution became light yellowish in color. The dry salt was distilled with phosphoric acid, to obtain the organic acid in the free state. It distilled between 98° and 100°.

The acid responded to the ferric chloride test for formic acid. Neutralized solutions slowly reduced silver nitrate, but without the appearance of a mirror. The potassium salt crystallized in beautiful stellate tufts. The free acid was found to be soluble in water and weak alcohols, somewhat soluble in 95 per cent. alcohol, and almost insoluble in absolute alcohol. It was insoluble in ether, benzene, petroleum ether, etc. The taste and smell of the acid were similar to those of formic acid, though not quite identical. It is, however, possible that impurities were present.

When the dry root was distilled with steam the distillate had only a very slight acid reaction. This may, perhaps, be accounted for on the supposition that the acid was, in this case, neutralized by carbonates in the root with which it came in contact in a not too dilute form. When the root was distilled with dilute sulphuric acid the free acid was readily obtained.

Careful examination of aqueous and alcoholic extracts of the root failed to reveal even traces of the following acids: acetic, citric, malic, tartaric, benzoic and salicylic. The first four named acids were tested for with particular care, since they have been found by various investigators in the fruit of the same plant. Although calcium oxalate was found to the extent of 6 per cent., no free oxalic acid or soluble oxalates were discovered. Phytolaccic acid may or may not be present. From the descriptions given by its discoverer it would appear that the acid he described was by no means pure.

It has seemed proper to calculate the acids in combination as potassium salts, since such a large amount of potassium is present. It is certainly reasonable to suppose that the salts exist as such in the root.

A portion of the dilute sulphuric acid extract was heated in a closed tube at 120°. The percentage of glucose was determined, and from this the amount of starch calculated.

Potassium nitrate crystallized from the alcohol extracts. Under the most favorable conditions a little less than 1 per cent. was obtained by careful crystallization.

After extracting the root with 90 per cent. and with 60 per cent. alcohol, an extract made with cold water was, after drying, 6·6 per cent. by weight of the dry root. The extract has a strong cathartic action, this property being tested by two persons. It is to be noted that the 95 per cent. and 60 per cent. extracts also possessed the same property, but to a less extent. These extracts, when strongly heated, emit an odor of popping corn.

A quantity of the root, first exhausted with water, was percolated with 95 per cent. alcohol. The tinctures frothed on boiling. On cooling there was deposited a whitish powder, the particles usually somewhat spherical in shape, each one with a short appendage. This substance is nearly insoluble in water, but rather soluble in alcohol. This may be the proximate principle described by Trimble. Only a small quantity was obtained. It has not been further examined.

Extended investigations were made to establish the presence of an alkaloid or glucoside. Although the examination was quite thorough, no substances of this nature were isolated. Further investigations will, however, be made as soon as fresh material is obtainable.

Tests were made for the alkaloids and the glucosides commonly occurring in plants, but with negative results in every case. Various methods of extraction were employed; *e. g.*, treatment of the aqueous extract with alcohol and with methyl and amyl alcohol; also with acidulated water and acidulated alcohols.

In purified aqueous extracts, precipitates were thrown down with some of the usual alkaloidal reagents, but not with picric acid or phosphomolybdic acid.

Attempts were made at every step to obtain the substance in crystalline form, but always without success. Purified extracts, acid and alkaline, were shaken with various solvents, as ethyl acetate, chloroform, ether, petroleum ether, and benzol. In many cases tests applied to the dissolved residues indicated the presence of an

alkaloid from both the acid and alkaline solutions. From this we are led to infer that the alkaloid—if one and only one be present—exists in the root as a salt, and also in its basic condition.

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## YERBA DEL POLLO.

By ALFONSO HERRERA, of Mexico.

Several plants of the family Commelinaceæ are known in Mexico by this name, and are to be found in cold as well as in warm and temperate regions. They grow on the sandy banks of rivers and brooks, and flourish from July until September.

Hernandez calls them Matlaliztic prima, secunda, texcocana, tercia, asphodelea, and coapatli. According to this author, the Aztecs used this plant to cure fevers, headaches, tumors and hemorrhages; and to give relief in child-birth. The hemostatic properties of the Yerba del Pollo were therefore known to the Indians, but this precious plant was forgotten, together with many other good and useful products of the conquered country.

Almost three centuries later, Alzate made known to his countrymen the remarkable activity of this plant in stopping the blood from wounds, but his efforts were useless, for the plant remained unnoticed until 1863, at which time we began to read about it in the works of Hernandez and Alzate; we repeated the experiments of these illustrious authors, induced physicians to use it, and began to seek for its active principle.

A short time afterwards, Mr. Touraine read the work of Padre Alzate, and, on trying the efficacy of the drug as a hemostatic, he met with great success; the results of his experiments and investigations he laid before the *Academia de Medicina de Mêxico*, on February 21, 1866; the paper was published in the *Gaceta Mêdica*, Vol. II. He asserted that nobody had studied the plant since Alzate's time, and he suggested for it the name Tradescantia erecta; the president of the Academy, Dr. Jimenez, observed that we had attracted his attention to the subject in the year 1863, and its extract had been applied to a number of patients with success.

*Synonyms.*—Commelina tuberosa, Linn. *Sp. Pl.* Ed. 1, page 41; C. B. Clarke, in D. C. *Monogr. Phanerog.* III, page 149; Andr. *Bot. Rep.*, t. 399; Schnizl *Iconogr.*, t. 48. Commelina parviflora, Reichl.

*Fol. Exot.* II, p. 17, t. 142, non Link. Commelina undulata, Lodd. *Bot. Cab.*, t. 1553, non R. Br.

Matlaliztic, Coapatli, Zoyol, Xochitl, Yerba del Pollo, Rosilla.

*Habitat.*—Valle de Mèxico, Orizaba.

*Analysis.*—The juice obtained by a simple pressure of the fresh plant has an acid reaction towards litmus paper. We have obtained some perfectly neutral liquid of a peculiar odor by placing the juice in a retort and distilling by means of a water bath, then adding to the bath calcium chloride in several portions, to increase the boiling temperature, and collecting the different fractions which came over. When but little juice remained in the retort its odor was found to have changed, and it possessed a strongly acid reaction; when this acid liquid was neutralized with bases, salts were obtained which were found to be acetates.

Another portion of the juice was heated to 80°, when a precipitate was formed which was found to be vegetable albumin. The liquid, filtered from the albumin, was concentrated to half its volume and treated with alcohol 33° Cartier, when a cheesy precipitate separated, which was found to be of an albuminoid nature. The residual liquid, after separation of this precipitate, was concentrated anew to remove alcohol, reduced to a small volume, and set aside for a while; potassium chloride separated as a result of this treatment, and on further concentration, more of the same salt separated, mixed with extractive matter.

An extract of the juice was obtained by evaporating the latter on a water-bath. It was partly soluble in water; when treated in the same manner as the juice, similar compounds were obtained. A small amount of ammonium acetate was also found in the extract, due, no doubt, to the pre-existence of acetic acid in the plant, and to the formation of ammonia from the proteid principle on the application of heat.

We obtained also a product neutral to litmus paper—smelling like the liquid produced by distilling the juice—by distilling the dry plant with simple water. If distilled with lime it afforded a liquid smelling like the foregoing, but reacting alkaline towards litmus paper. On saturating this alkaline liquid with acid an ammonium salt was obtained.

Ammonia may be obtained even in an ordinary temperature by wetting the powdered plant and mixing it with lime or the carbon-

ate of potassium or sodium. The dried plant also yielded chlorophyll when treated with ether.

In short, the Yerba del Pollo contains the following principles:

*In the juice*, acetic acid.

*In the extract*, ammonium acetate, potassium chloride, albuminoids, vegetable albumin, chlorophyll, extractive and cellulose.

In his paper about this plant, Padre Alzate owned that he believed the hemostatic influence of a mucilaginous plant could never be accounted for. Mr. Touraine proposed to seek and isolate the active principle. Some four years ago we determined to solve the problem, and undertook a series of experiments, that were too long to enumerate, since there are no fixed rules for arriving at an absolutely correct result, and determining certainly which one of these principles is the active one.

We can assert from the present moment, with regard to the extract, that it is not the extractive, chlorophyll, ammonium acetate or vegetable albumin. There remain the potassium chloride and the proteid principle, though it may be questioned if either of these has any hemostatic properties. We have seen, however, that the wet powder of the plant and the solution of the extract are most active hemostatics, and the analysis points out no principle worthy of notice in this connection but these two, so that it seems rational to attribute the hemostatic properties to them.

If it is the proteid principle and potassium chloride which act, in what manner is it? The question is rather difficult to solve, since proteid principles are of a very complex nature, and their molecules stand in such unstable equilibrium that the slightest modification in the conditions of their existence suffices to decompose them. Such are the albuminoid principles of Commelina, of blood, and of animal cells. We have observed in the analytical part with regard to the Commelina, that an elevation of temperature, the presence of alkali hydrates or their carbonates suffice to alter it, heat transforms it into an insoluble principle and a small quantity of ammonium acetate.

We need say nothing about blood, for its composition and alterability are perfectly well known, except to make the following quotation from Mialhe: "The three principal liquids of the animal economy, chyle, lymph and blood, are, when normal, alkaline."

With regard to contractibility of capillary vessels, we will quote

from Béclard's Physiology: "Pouring cold water on the natatory membrane of a frog, the calibre of its capillary vessels diminishes to a half or three-quarters of its normal size at least. Common salt produces the same effect. This contractibility can also be made evident by acid or diluted alkaline solutions."

Taking all these facts into consideration, we will hazard a theory which, though in no way invulnerable, might perhaps help us to explain a physiological fact. Applying on a broken vessel the powder of the plant, in a cataplasm, or a concentrated solution of the extract, the proteid principle of the herb mixed with the blood whose alkali reacts upon the former and affords a separation of ammonia; this reacts upon the vessels, irritating their tissue and contracting them, as Béclard observed; for it constitutes a very dilute alkaline solution, and has hemostatic properties sufficient to produce a complete obliteration of the vessels.

Mr. Touraine affirms to have seen this contraction of the vessels in several physiological experiments, and we have made similar observations, although not quite so certain of the results.

When we used the powder of the plant or the solution of the extract, the potassium chloride added its own action to that of the ammonia, and substituted the sodium chloride, whose action has been observed by Béclard.

Internally, Commelina cures metrorrhagia, which fact might be explained by the aforesaid chemical reactions; the proteid principle enters the current of the circulation. We will copy Hernandez according to the text, for it is both elegant and clear, and leaves no doubt about the latter application we have mentioned. With regard to the Matlaliztic texcocana, he says: "Radix discutit tumores praeter naturam a causa calida ortos, tusa, atque applicata, aut devorata, duarum drachmarum mensura, humore impetum coërcet, sanguinis redundantiam reprimit destumque refrigerat."

*Therapeutic Uses.*—The most distinguished physicians of Mexico use the extract of Commelina as a kind of a hemostatic in the treatment of metrorrhagia and hemoptysis, administering it in pills in the latter case, and in injections in the former. They employ it, too, as an active remedy against leucorrhœa, and as a general hemostatic in capillary hemorrhage.

*Posology*.—The extract is to be given in pills of 1 or 2 grains, which shall be taken to the number of twenty-four to forty-eight a

day. Injections are made by adding from 1 drachm to 1 ounce to a pound of water. In wounds, cataplasms may be made from the powder of the plant, or a concentrated solution of the extract may be applied by means of lint.

We copy from the proceedings of the *Academia de Medicina de Mexico*, session of February 21, 1866: "Dr. Lucia has repeatedly used Commelina to cure metrorrhagia, and always with success. Dr. Villagran has also used the extract in injections, the dose being a drachm to a pound of water, to cure metrorrhagia, and has always obtained the most satisfactory results. He has lately used it in an instance of cancer in the stomach, and has attained most unexpected success. Dr. L. Jimenez has also been fortunate in the use of injections of extract in two cases of uterine cancer, and in leucorrhœa accompanied with chlorosis. Dr. Miguel Jimenez has used the extract since the year 1864, and has made many experiments with the plant which prove its activity as a hemostatic. The greatest results are obtained according to this physician by the dose of a drachm in a pound of water. Its utility is incontestable in uterine cancer, but it is also useful in other forms of hemorrhage. Dr. M. Jimenez remembers an instance of hemoptysis in which he was surprised by the good results obtained with this medicine, for it prolonged the life of the patient in an unexpected manner. He has also used it to cure hemorrhoidal flux with success. He has failed, however, in some other cases of hemoptysis, on account, perhaps, of the patient vomiting, which prevented the action of the remedy."

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## RIEGLER'S METHOD FOR ESTIMATING SUGAR IN URINE.

By Henry C. C. Maisch, Ph.G., Ph.D.

This method, as described on p. 228 of the *American Druggist*, estimates the amount of sugar contained in urine indirectly by means of Fehling's solution. The reaction on which this depends is the liberation of nitrogen when Fehling's solution is brought in contact with phenylhydrazine hydrochloride.

The manner of applying this test is to boil the urine and Fehling's solution, and, after connecting the apparatus, the phenylhydrazine solution is added. In other words, the balance of the Fehling's

solution remaining after the reduction with urine, reacts with the phenylhydrazine liberating the nitrogen.

In theory, and then only with pure solutions, this method for the estimation of sugar is good; but I do not consider the method of any great utility with urine, basing my opinion entirely on theoretical grounds and experiments carried on with Fehling's solution itself. In handling a solution as complex as the urine, we must not forget that there are a number of compounds present, or might be present, which have more or less of a reducing action on Fehling's solution. Bodies of this character are uric acid, creatinine, allantoin, nucleoalbumin, lactic acid and biliary coloring matters, consequently, all probable constituents of urine. These compounds, however, are usually present in such small quantities that their presence becomes of especial importance where the percentage of sugar is small, and just in a case of this kind it is of the utmost importance to have a method which can be used in all cases without fearing that by the action of the reagent on other constituents of the urine a similar reaction might be brought about. This, to my mind, is the most serious objection to this method—in fact, to all the methods using the copper salts.

In my laboratory practice I have repeatedly proven to my own mind the statement just made in reference to Fehling's solution. I recall one case especially. The urine was furnished me with the statement that it showed Fehling's reaction rather strongly. It was from a lady looking forward to an early confinement, and a careful examination, with the elimination of all possible errors, was absolutely necessary. I found that the Fehling's test and the Boettger's test were both strongly reduced; but on subjecting the urine to the action of yeast, no fermentation took place and no difference in specific gravity, as by the Roberts method, was observed. Making examinations daily, I found that in about three or four days this apparent sugar reaction had entirely disappeared. This lady had been suffering from headache and had used one of the many headache remedies found in the market at the present time. This "sugar" reaction was very likely caused by one of the conjugate glycuronic acids.

At the present time I do not depend entirely on Fehling's test or Boettger's test, but run through the principal chemical tests, and in cases of uncertainty I use the Roberts differential specific gravity method for the quantitative estimation of glucose.

One of the reactions on which I depend to some extent is that of Rübner, and also its modification by Penzoldt; but even here the question will arise whether or not the same reaction is given by other compounds. Rübner uses 3 grammes lead acetate to 10 c.c. urine, filters, and adds ammonia water until a permanent precipitate is formed and then warms to about 80° C. The presence of sugar is indicated by the precipitate becoming pink or red, depending on the percentage. Penzoldt uses the subacetate of lead in place of the neutral acetate, and proceeds as in the original reaction.

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## ON THE OCCURRENCE OF STRONTIUM IN PLANTS.

By Henry Trimble.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 166.

Some months ago a number of barks were received from Dr. H. N. Ridley, of the Botanic Gardens at Singapore. They were chiefly barks representing the several species of the genus Castanopsis in that locality, and two species of oaks. The primary object in examining these barks was to learn the character of their tannins, but that is reserved for a later article.

In examining the ash of these barks a slight precipitate was noticed for strontium in the first one; this was passed by as being a small quantity of calcium, which was the most abundant constituent in the ash. But the ash of other samples also yielded precipitates indicating strontium, some of them in such quantity that the precipitate was washed thoroughly, treated with a few drops of concentrated hydrochloric acid, and the flame test applied; the result in every case was a distinct strontium flame. The strontium precipitate was gotten by three methods, viz.: precipitating with very dilute sulphuric acid, precipitating with an alkaline solution of potassium chromate, and, finally, by precipitating with solution of calcium sulphate.

The samples of Castanopsis were from the following: C. Wallichiana, C. Curtisii (two samples), C. Javanica, and C. Hulettii. The oak samples were from Quercus hystrix and Q. discocarpa. The Quercus hystrix was probably the richest in strontium of all the samples. None of them contained more than traces of the strontium salt. A sample of our American Castanopsis, C. chrysophylla,

from California, failed to show a trace of strontium, and yielded only about one-half the amount of ash that was obtained from the East India samples. One sample of Rhizophora, from a number recently received from Singapore, also indicated the presence of strontium. A letter from Dr. Ridley states that little, if any, strontium occurs in the soil of Singapore.

It is such a natural conclusion that strontium may replace calcium in plants, that the foregoing statement concerning its existence in plants may appear almost unnecessary. It was found, however, that most authors, in speaking of the ash constituents of plants, were either silent on the subject of strontium, or else referred to the one case where it has been found in seaweed. Dr. Emil Wolff, in his *Aschen-Analysen*, among some thousands of results, does not appear to mention strontium, not even among the seaweeds. Roscoe & Schorlemmer (*Treatise of Chemistry*, Vol. II, Part I, p. 213) state: "Strontium has also been found in sea water and in the ashes of Fucus vesiculosis."

Ebermayer (*Physiologische Chemie der Pflanzen*, p. 715) mentions strontium with some other metals as occurring in traces in a few plants, but he gives no definite information. Sachs (*Lectures on the Physiology of Plants*, p. 383) merely states that strontium *may* replace calcium in the fungi. Sorauer (*A Popular Treatise on the Physiology of Plants*, p. 36) calls attention to the fact that strontium has been discovered in several seaweeds. Goodale (*Physiological Botany*, p. 256) mentions strontium with some other metals as occurring in Fucus.

Messrs. Kebler and LaWall, in the May number of this JOURNAL, p. 244, pointed out the presence of strontium in opium. It was looked on as an adulteration, although we must admit the possibility of it occurring naturally in opium.

It may be that the writer has failed to discover all the literature relating to this subject, and he is free to admit the possibility of it, since the literature concerning the ash constituents of plants is very voluminous. Any information bearing directly on this subject will be thankfully received.

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*David Hooper*, who has held the post of Quinologist to the Madras Government, at Ootacamund, India, for the past twelve and a half years, has been appointed to the Curatorship of the Economic and Art Sections of the Indian Museum, Calcutta.

# ALEXANDRIA AND INDIA SENNA.

## METHOD OF DISTINGUISHING THEM IN POWDER.

By L. E. Sayre,

Member of Research Committee C, Revision Committee of United States Pharmacopœia.

The question of distinction and identification of the two sennas, Alexandria and India, was the subject of a recent preliminary paper by the author. Since the appearance of this, more careful and elaborate work has been done upon the same subject, the results of which are embodied in the present article. Some criticisms having been made upon this early work, due attention will also be paid to the disputed points in the endeavor to arrive at as truthful conclusions as possible. To aid in this, a series of photomicrographs have been carefully made, and are here reproduced. The accuracy of the drawings may be the subject of dispute, owing to the large personal factor that enters into their preparation, but the appearances shown by a photograph admit of no misconstruction, provided they be truly representative. It is unnecessary to state that in the present instance all reasonable precautions have been taken to show in a few reproductions as representative appearances as could be found in such limited areas. As contributing to a truthful understanding of the results obtained, a brief outline of the methods employed is given, and this is followed by the interpretations and conclusions.

While the true character of the tissues has been made the subject of careful study, the fact has constantly been borne in mind that the object of the whole matter is to secure a *simple* and accurate test for senna powders that shall be applicable to the uses of those for whom it is intended. It has been recognized that no one feature is found constant throughout the extent of the leaf, and that before any appearance can be pronounced representative, due care must be exercised by taking a sufficient number of observations. It is believed that all precautions have been taken in this investigation, and that the test proposed will prove reliable and sufficient.

*Methods.*—The photomicrographs of the epidermis were made from thin sections cut directly from the surface of the leaf, and subjected to no more treatment than was necessary to mount them in plain glycerin. The negatives were all made from these sections in a vertical camera of fixed length, attached to a Van Heurck micro-

scope whose optical parts were a Zeiss 8 mm. apochromatic objective and a No. 2 projection eye-piece. The source of illumination was the arc light, the crater of which was carefully focussed upon the object by the condenser. The actual magnification, measured by projecting the image of a stage micrometer upon the ground glass of the camera, is 240 diameters. No retouching or other alterations of the negative have been made. The drawings of parts

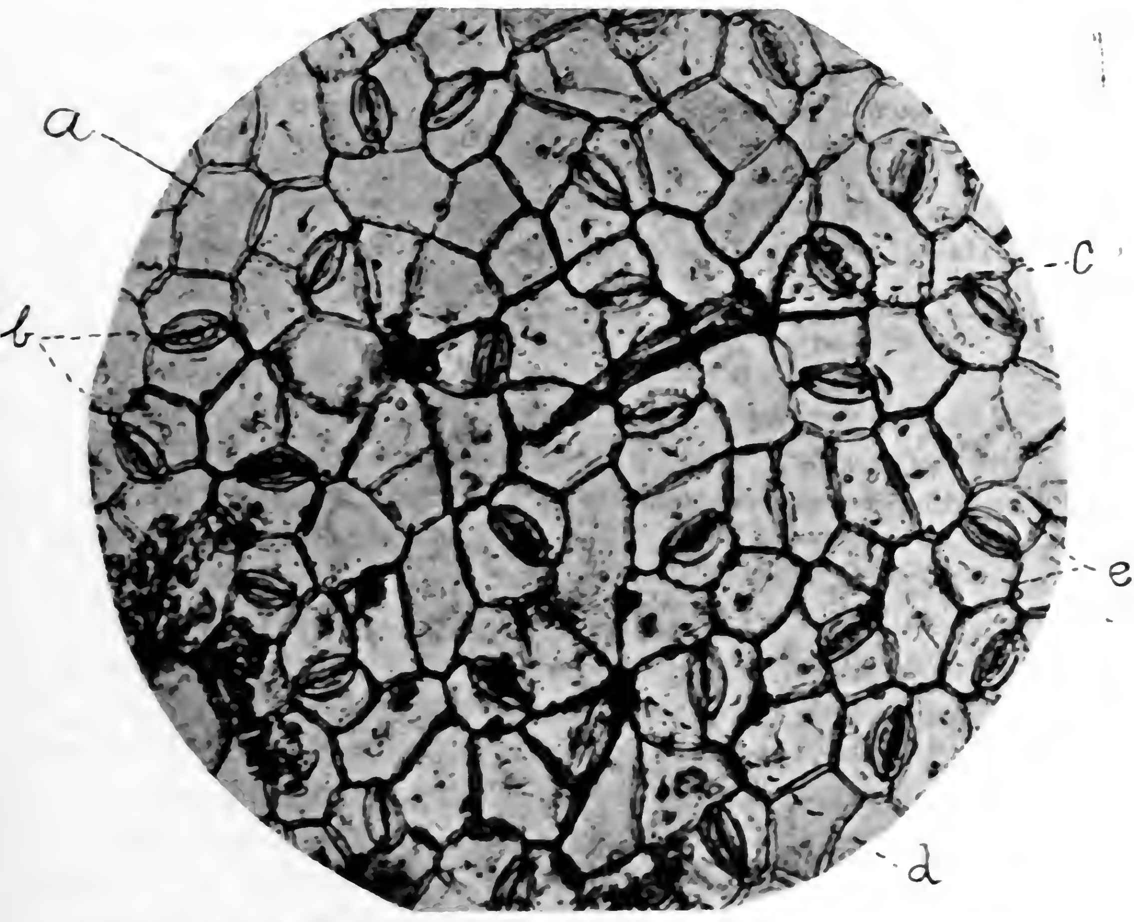


*Fig. 1.* India senna, under side of leaf; *a*, epidermal cell; *b*, stomata; *c*, hair; *d*, hair scar; *e*, nebenzellen.

found in the powder were all made by the camera lucida under like conditions of preparation and magnification. The amplification here is 200 diameters.

At the commencement of the work, in order to find some point of characteristic importance, the parts were thoroughly studied in their natural relations by means of sections, and the appearances there observed were then made the object of study in the powder.

Commencing in this manner with the ordinary epidermal cells, the following results were obtained: The size and shape of the epidermal cells are extremely variable (see *Figs. 6* and *7*), and are, as was stated in the former paper, little to be depended upon as a means of identification. However, no mistake was made in ascribing somewhat larger cells to the Alexandria variety, as the following table of careful measurements will show:

TABLE 1.

*India Senna.*
Lower side of leaf.

| Long diameter. | | Short diameter. |
|---|---|---|
| 13 | x | 10 |
| 13 | x | 8·5 |
| 13 | x | 7 |
| 15 | x | 12 |
| Av., 13·5 | x | 9·38 |

*Alexandria Senna.*
Lower side of leaf.

| Long diameter. | | Short diameter. |
|---|---|---|
| 14·5 | x | 11 |
| 17 | x | 10 |
| 10·5 | x | 9 |
| Av., 14 | x | 10 |

TABLE 2.

*India Senna.*
Taken at random with two-thirds objective. Some long and some short diameters.

| |
|---|
| 1·4 |
| 1·6 |
| 1·5 |
| 1·2 |
| 1·2 |
| Av., 1·38 |

*Alexandria Senna.*
Two-thirds objective diameter, taken at random.

| |
|---|
| 2·2 |
| 1·7 |
| 1·4 |
| 1·5 |
| 1·8 |
| 1·6 |
| Av., 1·7 |

TABLE 3.

*India Senna.*
Adjacent cells of upper side of leaf, two-thirds objective.

| |
|---|
| 1·7 |
| 1·8 |
| 0·6 |
| 1·5 |
| Av., 1·4 |

*Alexandria Senna.*
Adjacent cells of upper side of leaf, two-thirds objective.

| |
|---|
| 1·9 |
| 1·8 |
| 1·5 |
| 2·3 |
| 1·6 |
| 0·6 |
| 0·7 |
| Av., 1·48 |

AVERAGES EXPRESSED IN MICROMILLIMETERS.

TABLE 1.

| *India Senna.* | *Alexandria Senna.* |
|---|---|
| Lower side of leaf. | Lower side of leaf. |
| 38·61 x 26·815 | 40·04 x 28·6 |

TABLE 2.

| *India Senna.* | *Alexandria Senna.* |
|---|---|
| Average diameter, 40·02 | Average diameter, 49·3 |

TABLE 3.

| *India Senna.* | *Alexandria Senna.* |
|---|---|
| Upper side of leaf, 40·6 | 43·09 |

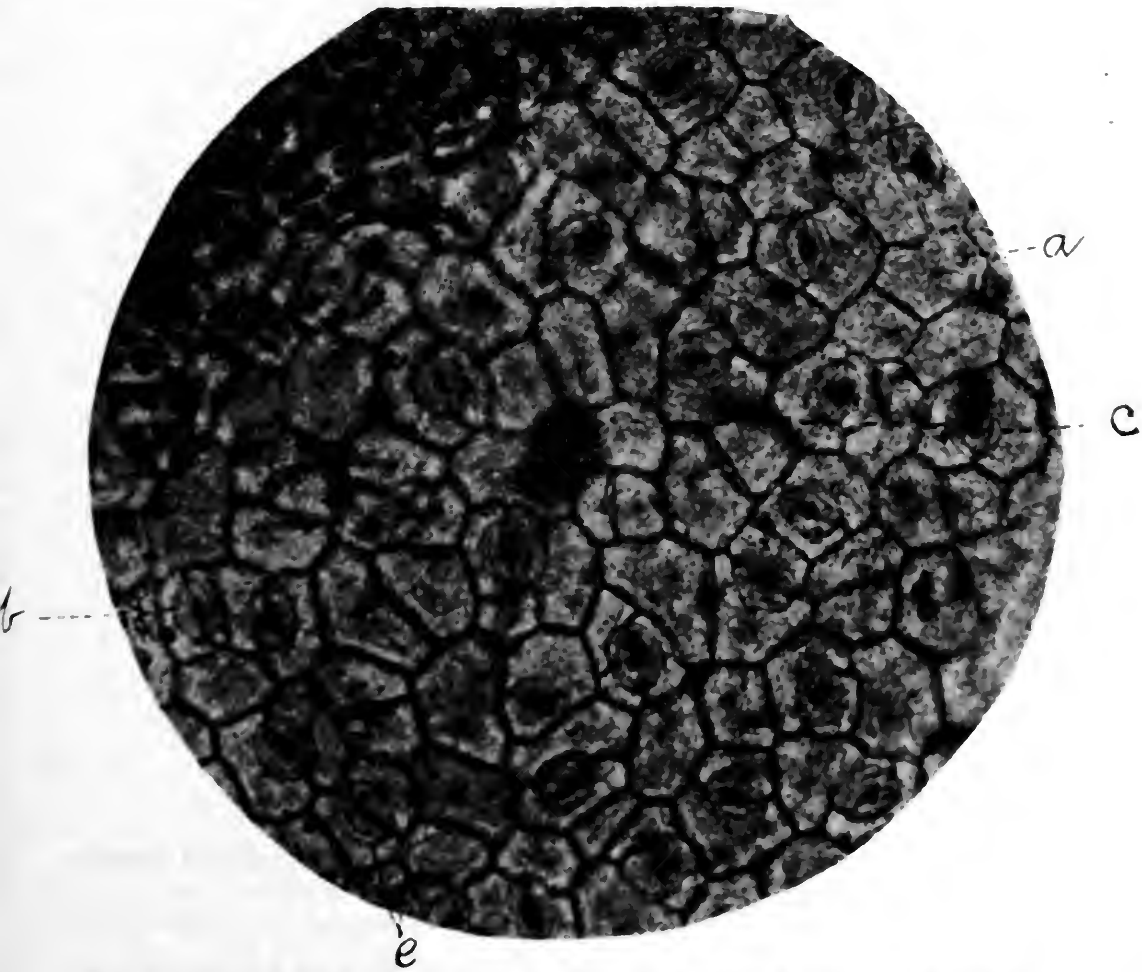


*Fig. 2.* India senna, upper side of leaf; *a*, epidermal cell; *b*, stomata; *c*, hair (scarcely in focus); *e*, nebenzellen.

Nevertheless, it is not to be denied that sections of epidermis may be found in which the India senna may exhibit the larger cells. A series of about forty measurements, made by a student in the school here, showed that while the largest cells are found in

the Alexandria senna, the average size of the cells of the India senna may be somewhat greater than those of the Alexandria senna. Likewise, the cell walls alone will not serve as a point of differentiation, owing to the same lack of uniformity. As regards the shape of the cells, no distinctive value whatever can be placed upon it, owing to the great variability present. The same may also be said concerning the arrangement of cells around the hairs. The

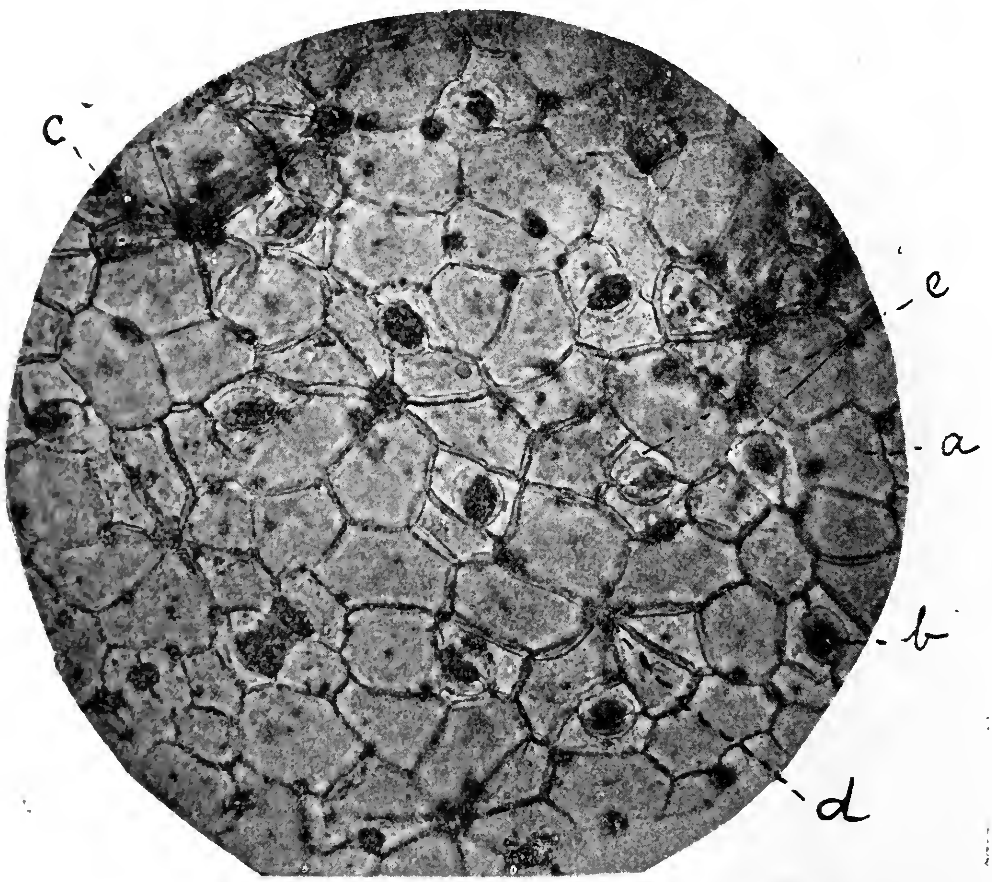


*Fig. 3.* Alexandria senna, under side of leaf; *a*, epidermal cell; *b*, stomata; *c*, hair (scarcely in focus); *d*, hair scar; *e*, nebenzellen.

distinction here made by Schneider does not hold, as a rule, although a small majority of cases may be found to accord with the statements made by this authority.[1]

In thirty cases, the stomata of Alexandria senna showed sixteen with two neighbor-cells (nebenzellen) and fourteen with three. Forty stomata on the epidermis of India senna exhibited twenty-

[1] *American Druggist*, April 10, 1897, p. 195.

two with two nebenzellen, fifteen with three, and three with four. These results seem to eliminate the epidermal cells from further consideration, but more of value may be expected of the stomata. Exception will have to be taken, however, to the statements made by Schneider concerning the number and size of the neighbor-cells (nebenzellen). That the India senna usually possesses two, and


*Fig. 4.* Alexandria senna, upper side of leaf; *a*, epidermal cells; *b*, stomata; *c*, hair (in focus); *d*, hair scar; *e*, nebenzellen.

the Alexandria senna a larger number, is easily disproved by the accompanying figures.

Likewise the statement that when two are present in the Alexandria senna they are of equal size, cannot be confirmed by examination. (See *Figs. 3* and *4*.) But whatever number may obtain in either case, it is so inconstant a character as to be of no value as a discriminating factor. There is, on the contrary, a point of great distinctive value to be found in the size and shape of the

stomata themselves, a feature that was overlooked in the preliminary paper. Here it will be noticed that almost invariably the stomata of the Alexandria senna are smaller and much rounder than those of the India. References to *Figs. 1* and *4* will make this clear. Measurements of a considerable number of stomata in each case gave the following ratio between the longer and shorter diameters: In Alexandria the shorter diameter bore a ratio to the larger of 0·84 to 1; in the India, of 0·6 to 1.

Occasionally stomata of a rounded form may be found in the India senna, but they do not look like the Alexandria and are

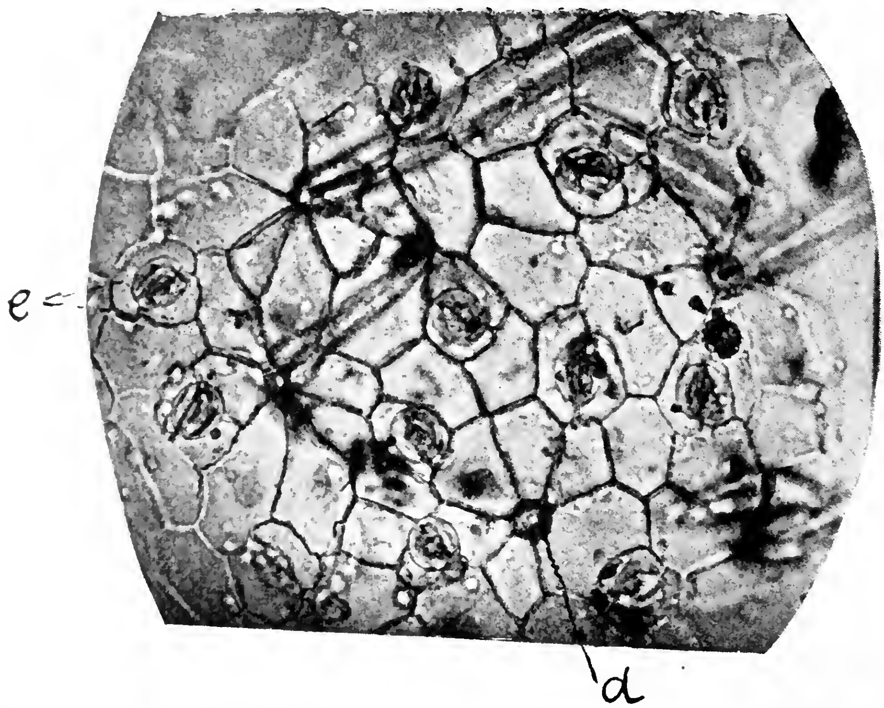


*Fig. 5.* Alexandria senna, showing number of hairs in a limited area; *d*, hair scars; *e*, nebenzellen.

larger. At the present state of the investigation, this character represents by far the most characteristic difference between the two species and, together with the number of hairs, affords the best means of detecting a mixture of the two in powdered form.

The opinion reached by the author in the former paper, that the number of hairs shown by the two species is a valuable means of distinguishing them apart, is, after yet more careful research, again advanced. It would seem at first sight that the test proposed by Schneider, *i. e.*, estimating the number of hair scars upon the epi-

dermis, would be more accurate than counting the free hairs in the powder; but it is really unreliable, because the distribution of the hairs is not uniform. This objection does not apply to the counting

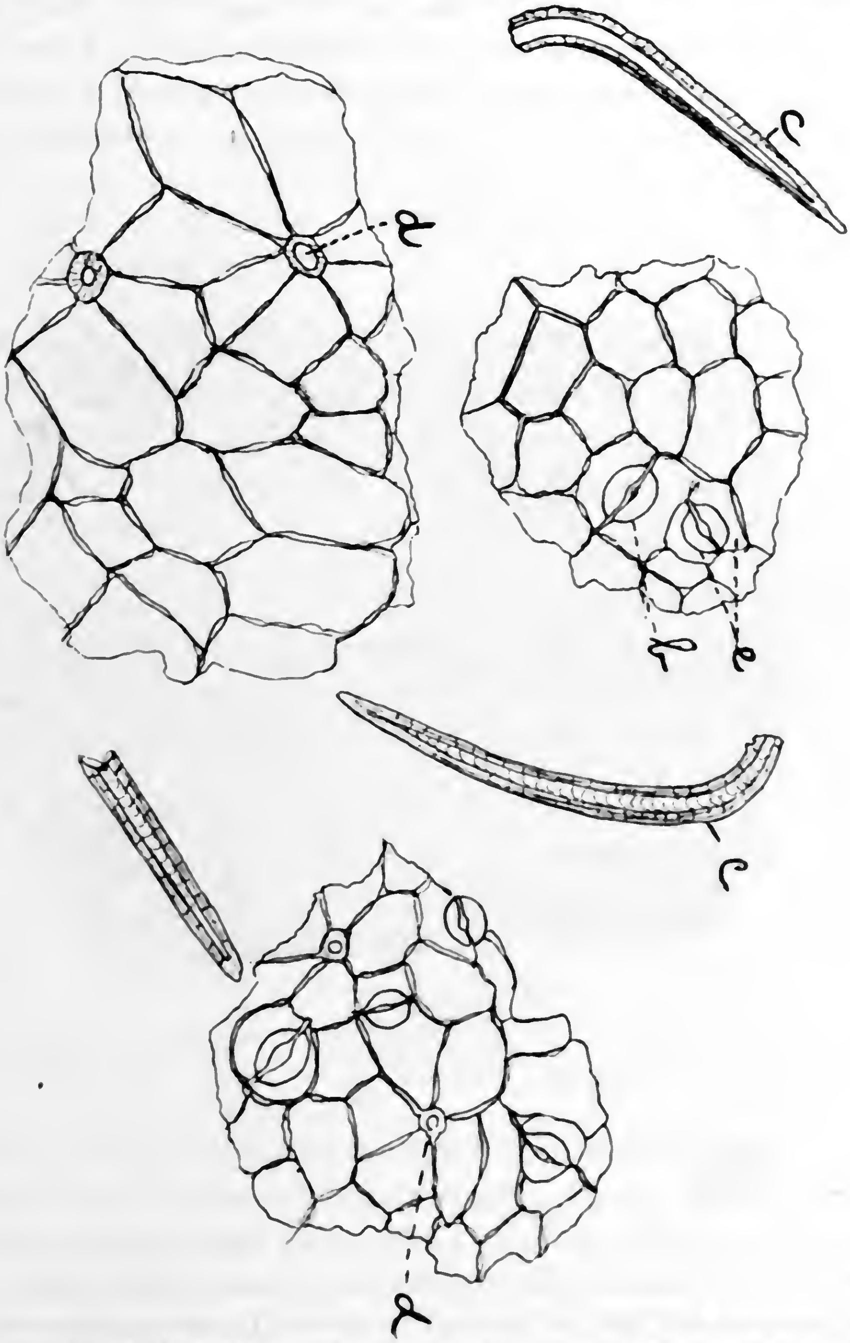


*Fig. 6.* Alexandria senna, No. 60 powder; *b*, stomata; *c*, hairs; *d*, hair scars; *e*, nebenzellen.

of the free hairs, for by powdering the leaves and shaking the powder up in a liquid, the distribution is made comparatively uniform.

The objection that fragments may be counted as whole hairs is easily overcome by choosing some readily distinguishable part of the hair, such as the tip, and using only it as the unit of estimation.

From the results obtained in the latest series of experiments the following test appears sufficient to distinguish either senna alone, or a mixture of the two, and it is therefore proposed for these purposes: Take a portion of the No. 60 powder and place it in a small homœopathic vial, and add to it twice its volume of a mixture

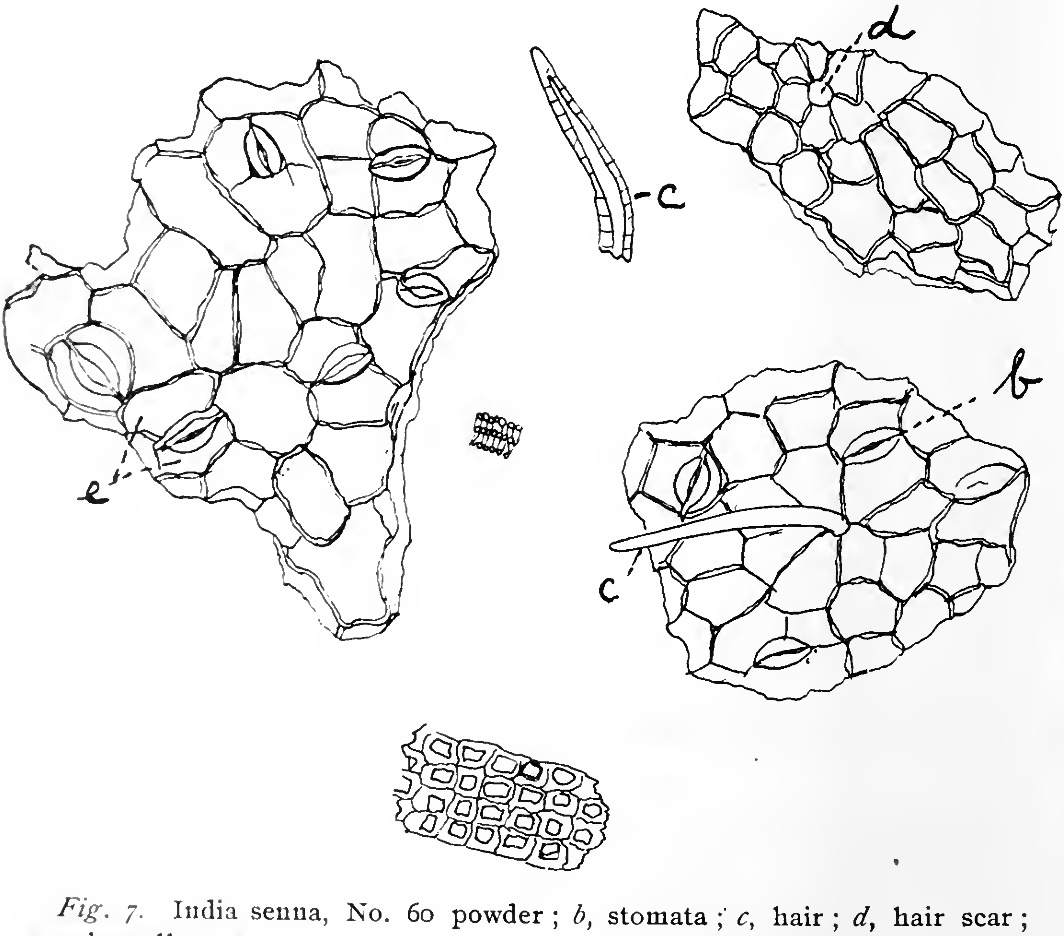


*Fig. 7.* India senna, No. 60 powder; *b*, stomata; *c*, hair; *d*, hair scar; *e*, nebenzellen.

of water and glycerin in equal parts. Thoroughly shake this mixture, and while still turbid with the suspended powder, place a drop on each of several glass slips, and cover with cover glasses. If air bubbles or too great opacity exist, heat to boiling over an alcohol lamp. Search for hairs showing the tips present, and if they appear abundant, one to four in each field of a ¼-inch objective, Alexandria senna is present. To further confirm this, examine several frag-

ments of the normal epidermis for the stomata. If many are found that are quite round in outline (*b*, *Fig. 4*), the presence of Alexandria senna is assured. As confirmatory to this, the number of hair scars upon the epidermal fragments may be employed. These should be found frequently at a distance of from two to five epidermal cells apart. A sample of India senna, on the contrary, will exhibit few hairs, often none in the field, and the great majority of the stomata will be found with the long diameter much longer than the short one (*b*, *Fig. 1*). The hairs should not frequently be closer than five epidermal cells apart. In simple powders the mere number of hairs present will at once distinguish between the two sennas, but in cases of mixture of the two, the shape of the stomata will have to be examined. Many of the elongated oval form always indicate the presence of India senna.

However good a test may be theoretically, it is of no value unless it works practically. The only way to tell whether it will do this or not, is to put it in practice under conditions which will represent, as nearly as may be, those of its usual employment. In this particular instance the test proposed was given a thorough trial in the hands of eighteen students of representative abilities, and in no case did it fail to work, either with simple powders or mixtures.

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## ASSAY OF SPIRIT OF NITROUS ETHER.

By Lawrence A. Kessler, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 167.

My attention was attracted to this subject by a series of papers which appeared in the *American Druggist and Pharmaceutical Record.* To the number of that journal for December 25, 1895, Professor David Walker contributed an article in which he proposed a rapid method for the volumetric assay of spirit of nitrous ether. His process of assaying was based on the measurement of the iodine liberated from potassium iodide, through the decomposition of spirit of nitrous ether by the United States Pharmacopœia process of assay.

The proposed test was made by carefully measuring 5 c.c. of spirit of nitrous ether into a 4-ounce Erlenmeyer flask, from a pipette; this was followed with 10 c.c. of 6 per cent. acetic acid and

10 c.c. of potassium iodide test solution. The mixture was occasionally agitated during ten or fifteen minutes, a few drops of starch test solution added, and the mixture titrated with decinormal sodium thiosulphate volumetric solution, until the bluish-green color was discharged. The mixture afterwards assumed a dark color; but if the time of maceration does not exceed fifteen minutes, the number of cubic centimeters required to first discharge the color will give nearly or quite as accurate results as the nitrometer. Prof. Walker also said: "While the titration process may not be quite as accurate in its figures as the modified Allen method, it involves much less expense, and the results are sufficiently accurate for practical purposes." This last claim Prof. Walker seemed to have substantiated by the figures of a table which he gave to show the results of the assay of ten samples by the two methods.

On January 25, 1896, the same journal published a letter from Mr. Peter MacEwan, of London, England, in which that gentleman directed attention to the fact that the method proposed by Professor Walker had been suggested by Mr. D. B. Dott a dozen years ago, and had to be abandoned on account of the fallacious results, for whenever the nitric oxide liberated by decomposition of the ethyl nitrite comes in contact with the air of the flask, nitrogen tetroxide is formed. This at once decomposes more of the alkaline iodide; indeed, decomposition might go on indefinitely if the supply of air and iodide were large enough. Mr. Dott endeavored to obviate this objection by various means, such as working with an open dish in which carbon dioxide was simultaneously generated, but with modified success. It was his knowledge of the difficulties of this method which led Mr. A. H. Allen to effect the reaction in an air-free space and estimate the nitric oxide instead of the iodine; the method was adopted by many chemists, and simultaneously indirect estimation through the iodine factor was deservedly forgotten. A man who knows all the worries of the latter process may get fairly accurate results, but the novice or careless worker may return a 3 per cent. ethyl nitrite spirit as containing anything between that and, say, 30 per cent., because he is never sure about the end point.

Professor Walker defended the utility of the titration method in a reply to Mr. MacEwan in the issue of February 10, 1896, and stated that further investigation had shown that five minutes' maceration was ample for the completion of the reaction. As stated at the begin-

ning of this article, my attention was attracted by the controversy referred to, and I undertook some experiments with the titration method as proposed by Professor Walker, in order to ascertain if it could be placed in the hands of pharmacists as a practical method.

In the first set of titrations, sufficient decinormal sodium thiosulphate volumetric solution was added to discharge the bluish-green color, so that it did not return in thirty seconds. The reason for adopting this plan was to afford the operator proof that decoloration had been effected. The color quickly reappeared after decoloration on account of the liberation of iodine by the nitrogen tetroxide, as pointed out by Mr. MacEwan. This reaction is also, of course, going on from the time the materials are mixed, and even during titration, so that iodine is being alternately liberated and titrated. The tendency of the method must, therefore, be toward high results, for the same iodine is repeatedly taken into account. The rapidity with which the volumetric solution of sodium thiosulphate is added, as also the quantity added at a time, influences the amount required for decoloration. The more rapid the addition of sodium thiosulphate and the larger the portion added, the less the total quantity required for the first decoloration.

The following figures show the amounts of decinormal sodium thiosulphate volumetric solution required for the titration of the iodine liberated by portions of 5 c.c. of a few of the samples of spirit of nitrous ether examined:

| Sample No | Minutes Macerated. | C.C. of V. S. Required. |
|---|---|---|
| 1 | 15 | 24·7, 23·1, 14·4, 14·0 |
| 2 | 15 | 14·2, 16·1, 10·2, 10·7 |
| 3 | 15 | 20·5, 20·2, 18·9, 19·4 |
| 4 | 15 | 28·2, 28·3, 32·2 |
| 5 | 15 | 30·4, 30·8, 33·6, 34·5<br>35·3, 37·3, 37·3, 32·0 |
| 5 | 10 | 25·2, 27·3 |
| 5 | 5 | 24·6, 20·6 |

The titrations were conducted as nearly alike as possible. The figures for sample 5 also show the effects of the time of maceration. After concluding that the titration method was not trustworthy, even when conducted under the conditions and restrictions proposed, I made a series of tests with the nitrometer according to the United States Pharmacopœia process of assay. Two difficulties were

encountered in this method. One of these difficulties attended the assaying of samples of the spirit which were acid in reaction; it consisted of a decomposition between the acid spirit and the potassium iodide, with evolution of nitrogen dioxide before the normal sulphuric acid was added. Spirit of nitrous ether is usually acid; of the sixteen samples examined during the course of this work, not one was neutral, but most of them were very acid. To overcome the difficulty referred to, the sample to be assayed was neutralized by mixing it with one-fifth its volume of an alcoholic solution of potassium hydrate. Six c.c. of this mixture instead of 5 c.c. of the original sample were then taken for each estimation.

The following figures show the results which were obtained by the official method on the same sample, before and after neutralizing:

| Sample A. | Acid. | | Neutralized. | |
|---|---|---|---|---|
| (1) 5 c.c. gave | 22·0 c.c. | NO and | 21·0 c.c. | NO. |
| (2) 5 " " | 24·0 " | " " | 20·4 " | " |
| (3) 5 " " | 24·4 " | " " | 20·4 " | " |

The other difficulty encountered in the official assay process was the displacement of air from the aqueous solution of potassium iodide when this liquid was let into the burette of the nitrometer containing the spirit on top of the brine. Any inaccuracy which might arise from this cause could be prevented by raising the level tube and then opening the stopcock so the air could pass out. But this could not be done unless the sample was free from acid, on account of the premature reaction which takes place between the potassium iodide and the spirit in the presence of acid. To obviate this difficulty, I tried using a saturated alcoholic solution of potassium iodide in place of the aqueous solution, as directed by the United States Pharmacopœia. The results were satisfactory, as but little or no air bubbles collected in the burette. In order to supply the required amount of potassium iodide, which is not so soluble in alcohol as in water, 20 c.c. of a saturated alcoholic solution were used instead of the 10 c.c. of aqueous solution of potassium iodide.

Three samples were neutralized with the alcoholic solution of potassium hydrate, and submitted to the official method of assay with the nitrometer, the alcoholic solution of potassium iodide being used in place of the aqueous solution ordered by the Pharmacopœia. The results were as follows:

| Sample. | | | | |
|---|---|---|---|---|
| B | (1) 5 c.c. | gave | 21·6 c.c. | NO. |
| | (2) 5 c.c. | " | 21·6 " | " |
| C | (1) 5 c.c. | " | 50·0 " | " |
| | (2) 5 c.c. | " | 50·0 " | " |
| D | (1) 5 c.c. | " | 47·0 " | " |
| | (2) 5 c.c. | " | 47·2 " | " |

The displacement of air from the aqueous solution of the potassium iodide might also be overcome by boiling the solution and allowing it to cool out of contact with air just previous to use, but this method was not tried.

The quality of the spirit of nitrous ether dispensed is remarkably poor.

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## NOTE ON RED MERCURIC OXIDE.

By Joseph W. England.

I have read with interest Mr. Charles H. LaWall's paper on the "Consideration of Some Recent Suggestions Concerning Ointment of Mercuric Nitrate," as published in the current issue of the American Journal of Pharmacy.

It will be recalled that I urged the use of red mercuric oxide in place of metallic mercury, in the making of citrine ointment. This practice was suggested as an alternative, and not as a substitute for the official formula. The average pharmacist always has red mercuric oxide in stock; he does not always have metallic mercury, and it was thought to be directly on the line of increased convenience to urge the substitution of the oxide, in proportionately larger quantity, for the metal, when occasion required.

To the use of red mercuric oxide in place of metallic mercury for this purpose, Mr. LaWall says: "As to the relative purity of the two substances, the experience of a large manufacturing establishment shows that the commercial metallic mercury is of far greater uniformity and purity than the red oxide of commerce."

This statement does *not* accord with the writer's information. A letter from one of the leading firms of manufacturing chemists says: "We would state that our red mercuric oxide conforms strictly to the requirements of the United States Pharmacopœia, and we regard it as equal in purity to metallic mercury."

Another firm of manufacturing chemists, equally as prominent, writes: "Our analysis shows that red mercuric oxide contains 99·7 per cent. HgO, and 0·3 per cent. of $SiO_2$. The silica is, no doubt, derived from the vessels in which the mercuric oxide is manufactured. Commercial metallic mercury varies between 99 and 100 per cent., while the distilled mercury is pure."

Another prominent chemical firm writes: "We would state that our levigated mercuric oxide conforms to all the requirements of the U.S.P. 1890, save as regards absolute freedom from $HNO_3$; it contains very small traces of the latter. It conforms strictly to all the requirements of the Ph.G. iii, also, in regard to $HNO_3$. There is no doubt that the U.S.P. is hypercritical in the case of red mercuric oxide, as it is also in several other instances; for the faint traces of $HNO_3$ that our levigated grade contains are not known to interfere with any of the chemical applications of the preparation, and cannot possibly have any influence on the therapeutic action of the medicament. To provide an oxide absolutely free from $HNO_3$, is practically impossible commercially, and there is no necessity for the preparation."

Now, the point the writer would make is this: If the statements of three of the leading chemical firms of the country, regarding the purity of their red mercuric oxide, be true, then there should be no difficulty whatever in the pharmacist procuring an oxide that could be used as a substitute, if necessary, for metallic mercury in the making of ointment of mercuric nitrate.

Further, the writer recommended the addition of glycerin to the finished ointment, *not* to prevent *sponginess*—that is a condition due to the application of insufficient heat—but to prevent the hardening and ultimately friable condition that obtains in the ointment on long standing. Regarding the criticism that the addition of 50 grammes of glycerin to 1,000 grammes of ointment of official strength reduces the percentage of mercuric nitrate below that required by the U.S.P., there is this to say: that the resulting difference in strength is of no practical moment *therapeutically*, as physicians almost invariably—save in those cases requiring great stimulation—dilute the ointment they prescribe—oftentimes in equal proportions—with lard or other fatty diluent.

The final criticism of increased cost is hardly worth consideration. The alternative use of 75·5 grammes of mercuric oxide (costing

about 6 cents an ounce avoirdupois) as against 70 grammes of metallic mercury (costing about 5 cents an ounce, avoirdupois), to make the official quantity of ointment, or a little over 2 pounds, is of no practical moment whatever.

A sample of the ointment made on March 17, 1897, by the use of red mercuric oxide, is presented to this Pharmaceutical Meeting. While it has slightly darkened in color, it has retained its smoothness, and has undergone no hardening whatever.

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## NOTE ON A SAMPLE OF SCAMMONY.

By I. W. Thomson.

Some time ago a parcel was handed to me, marked "Scammonium," accompanied by a statement that it contained 84·864 per cent. of scammonium, and, that there might be no mistake, gave the chemical formula, which is generally accepted as representing that body $C_{32}H_{56}O_{16}$. It was said to be of German origin.

A very cursory examination of the sample so completely belied its certificate of character, that I concluded it could hardly claim more than a very remote relationship with scammony.

Having mentioned the circumstance to Mr. Hill, he suggested that I might exhibit the sample and submit the result of my examination of it at an evening meeting.

The sample consists of irregular broken pieces, apparently portions of a cake, about half an inch in thickness, greenish-black, hard and horny, breaking with a resinous fracture, and very difficult to powder. On submitting it to a systematic examination, the following results were obtained:

| | Per Cent. |
|---|---|
| Soluble in ether | 0·4 |
| " " alcohol | 2·0 |
| " " water | 42·6 |
| Starch and a little cellular tissue | 43·0 |
| Moisture | 12·0 |
| | 100·0 |

It yielded 2·12 per cent. of ash, of which 0·93, equal to 43·6 per cent. was soluble in water. The ash contained K, Mg, Ca, Fe, and Si, as carbonate, sulphate, and a trace of chloride.

The water-soluble portion was evidently gum, apparently gum

arabic. The insoluble portion consisted very largely of starch, with a small quantity of cellular tissue.

So far as I know, the specimen is unique, and the Germans must think us very gullible when they attempt to foist such an article upon us as scammony.—*Pharmaceutical Journal*, March 20, 1897.

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## THE CULTIVATION OF SUMBUL IN ENGLAND.[1]

BY E. M. HOLMES.

The sumbul root of commerce has of late years been of very inferior quality compared with the fragrant root imported twenty-five years ago or more, and usually consists of smaller and more cylindrical pieces, with only a very faint musky odor. The structure is also much firmer, and the resinous parts are usually blackish and dirty, in strong contrast to the paler non-resinous portions. The upper or rootstock portion, which is marked with rings like the true sumbul, is evidently often branched, which I have never seen in the true sumbul, in which the upper portion usually tapers to a rounded fibrous apex.

The sumbul of the present day is, therefore, probably derived from a different plant with a more cylindrical root, branched near the apex, and having a firmer substance. It was suggested some years ago by Dr. J. E. Aitchison (*Trans. Linn. Soc.*, ser. 2, Bot., p. 69, pl. 20-21) that it might possibly be derived from Ferula suaveolens, which has only a faint musky odor. He states that the root is scented, and is one of the kinds of sumbul exported from Persia to Bombay by the Persian Gulf (*l. c.*, p. 69).

It seems to be desirable, therefore, that the true sumbul should be cultivated to meet a trade desideratum. The use of an inferior drug will otherwise probably lead in time to the entire disuse of the drug. Under these circumstances my own experience in the cultivation of the true sumbul plant may prove interesting to some of the readers of the *Pharmaceutical Journal*.

Some years since, one of our corresponding members, M. Andrew Ferrein, of Moscow, sent me some young plants of Ferula fœtidissima, and with them two young plants of F. sumbul. They arrived in autumn, packed in husks of buckwheat, like ordinary bulbs. The fleshy roots at that period of the year appear to lose all the small

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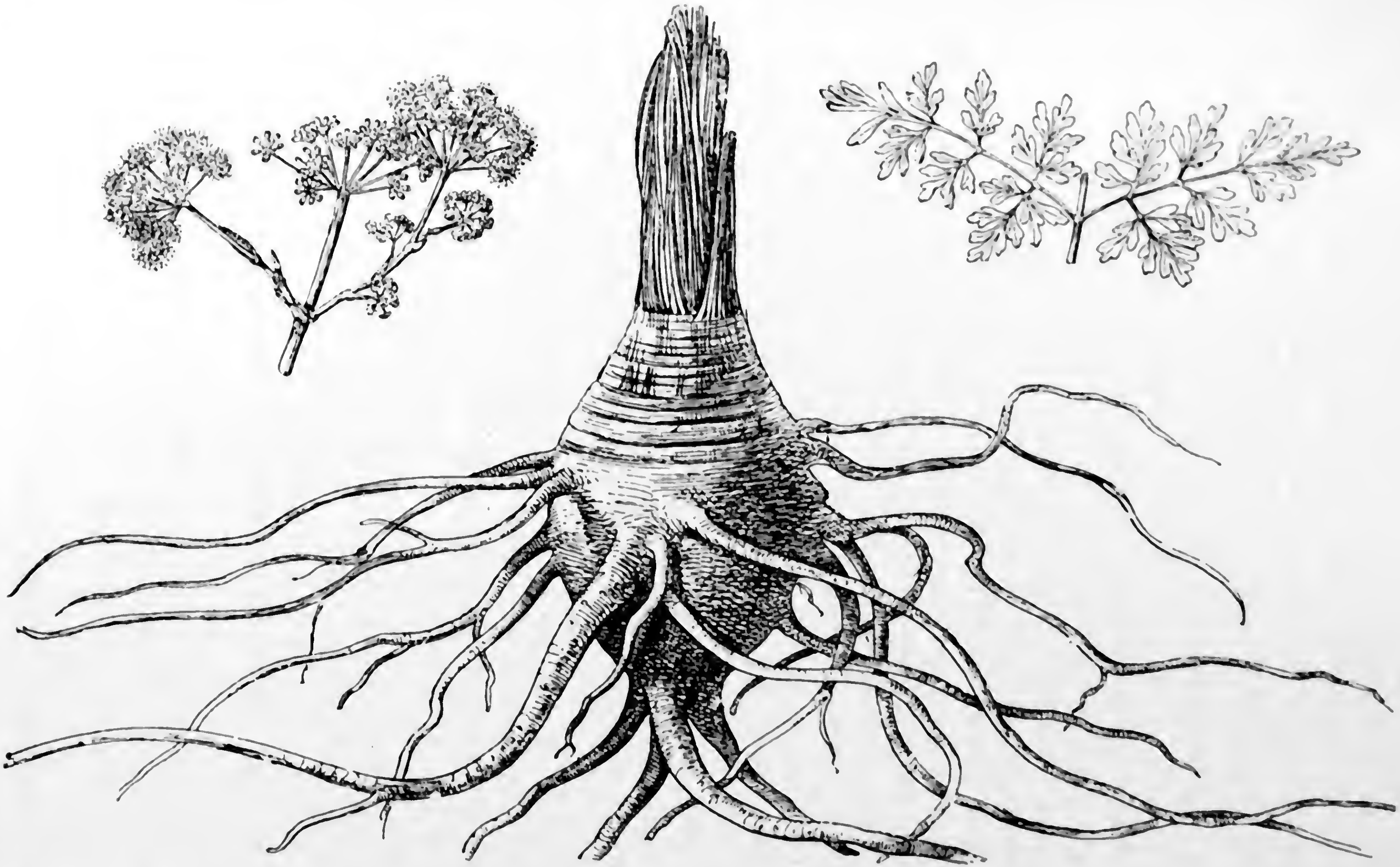
[1] *Pharmaceutical Journal*, April 24, 1897.



*Ferula Sumbul.* Root grown at Seven Oaks, Kent, together with portion of leaf and flower (all one-ninth natural size).

rootlets, and will then bear digging up and transplanting without injury, the tuberous root sending out, in the following early spring, new rootlets.

In February, or, in late winters, in March, as soon as the ground is no longer hard from continued frost, the sumbul plant sends up one or more young leaves. These may be a little injured if exposed to hard frost, although not injured by white frost, but as a rule new leaves come on, and the plant stands our winters as well as most indigenous plants of the same natural order. The fully developed leaves appear in April, and continue to grow until July, when they turn yellowish and gradually wither. The root increases in size every year, retaining its oval form, presumably, until it attains a sufficient reserve of nutrition to enable it to throw up a large fruiting stem. The inflorescence of the specimen that flowered in the Kew Gardens some years ago attained a height of about 8 feet, and the plant then died.

To secure the healthy growth of the plant, it is necessary to give it plenty of water, and a little weak manure water, during the growing season, from April to July. A mulch of well-rotted manure around the plant in the autumn, taking care to protect the crown by a covering of clean sand, also helps its growth. My plants, which are now about six years old, have not flowered, but the root of one, which I took up a few days ago for transplanting, measured about 6 inches long by 3½ broad, and had a strong, persistent musky odor where injured, exuding abundance of white, milky juice. The roots are somewhat twisted, and spread nearly horizontally below the ground. It is obvious from the shape that such a root might furnish two tapering and one cylindrical sections of the thickness of the old-fashioned, but that it could not furnish the cylindrical pieces 2 or 3 inches long, of small diameter, that occur in the drug of the present day. Provided that good seed could be obtained, there is little doubt that sumbul might be cultivated in temperate or mountainous districts in the colonies, or in ordinary gardens or fields in this country without any difficulty.

The chief difficulty in obtaining good seed is due to the fact that in this country the fruit are apt to be ruptured by the rains. In their native country, the fruits are produced in the hot weather. In this country, therefore, it is necessary to protect the ripening fruits from rain.

## THE ETHICS AND ECONOMICS OF PROPRIETARY PREPARATIONS.[1]

Dr. Charles Rice, a member of the Committee of Revision of the United States Pharmacopœia, and the chemist of the New York department of public charities, has lately thrown a good deal of the light of common sense on the question of the advisability of using proprietary preparations. What he says is in the form of a report to the committee on the apothecary's department of the medical board of Bellevue Hospital, made in compliance with a request from that body. The report was adopted by the medical board on April 1st, and has been approved by the board of commissioners.

Dr. Rice defines a proprietary article as one of which some person or persons have exclusive control of the production, sale or use—of all three of these features in some cases, of one or two of them only in others. He divides such articles into natural and artificial products, and again into these three classes: (1) Products of nature prepared under patents and mostly sold under copyrighted names. (2) Products of nature that have never been made under patents or are no longer so made, but are sold under copyrighted names. (3) Artificial preparations sold under copyrighted names. As regards patented articles, it is a principle in patent law, says Dr. Rice, that a product of nature cannot be patented; hence no patent is granted on any chemical substance of a definite and constant composition, even though it may, at the time when the patent is applied for, not yet have been found occurring ready-formed in nature. But any process, not previously known or used, by which such a product can be formed is patentable. Certain articles that are made by patented processes may also be made by processes that are not patented, and, as it is impossible for the purchaser to distinguish by which process they have been made, nobody, says Dr. Rice, would think of raising any objection against their use in medicine. As an example, he mentions salicylic acid, which, in the form of methyl salicylate, exists in oil of wintergreen and some other volatile oils, from which the acid may readily be prepared; but as these oils would be utterly inadequate to supply the demand, more than 95 per cent. of the salicylic acid used in medicine is produced by a process that was

[1] Editorial in the *New York Medical Journal*, May 22, 1897.

patented in 1874, but on which the patent has now expired. A patent, says Dr. Rice, not only does away with all secrecy—which is usually considered the objectionable feature of a proprietary article —but it commonly acts also as a sort of guarantee of the uniformity of the product in composition, strength and purity.

Dr. Rice thinks that if all these points are taken into consideration, it will probably be conceded that, if an article is protected by a patent alone—the feature of a copyrighted name being disregarded—it becomes practically impossible to separate patented substances into classes of which one may, and the other may not, be used without a violation of ethics, and, therefore, none of these articles should be rejected for the reason alone that they are patented. He then proceeds to consider the three classes of proprietary articles previously mentioned.

As to products of the first class, inasmuch as copyrights on names never expire, whereas a patent has a definite term of years to run, it is evident, says Dr. Rice, that the proprietors of the copyrights would have a perpetual monopoly unless, after the expiration of the patents, other producers should put the same articles on the market under new names not copyrighted. All these bodies—such as antipyrine, aristol, phenacetine, salol, salophene, sulphonal, trional, and vanillin (the last-named substance being now sold only under its proper chemical name)—will undoubtedly, Dr. Rice thinks, be rescued from their present monopolistic control, when the patents on them have expired. There is no secret whatever about them, he says. They are definite chemicals of known composition and properties, and, since some of them have been found to have real therapeutical value, no objection, it is believed, will be raised against the whole class.

Dr. Rice next considers the products of nature which have never been, or are not now, made under patents, but are sold under copyrighted names, familiar examples of which are antifebrine (acetanilid), dermatol (bismuth subgallate), formalin or formol (formaldehyde), pyrozone (hydrogen-dioxide solution), diuretin (sodium-theobromime salicylate), and lanolin (hydrous wool fat). The owner of the copyrighted name, he remarks, usually professes that his product is "purer" or more "refined" than the article found on the market under the common name, and this pretension, he says, is true in some instances, particularly in those articles first

put on the market under copyrighted names, although at present the best grades of the several articles sold under their common names appear to answer every purpose. These products, he thinks, are unobjectionable, but he says it seems preferable, as it is certainly more economical, to order them under their common names, especially acetanilid, bismuth subgallate and formaldehyde.

His third class preparations that are not products of nature, sold under copyrighted names, Dr. Rice divides into three groups. The first group, which he considers unobjectionable, comprises preparations the origin and composition of which are not kept secret, such as ichthyol, creolin, Mellin's food, malted milk, etc. The second group, which he thinks to be of doubtful value, includes all the preparations of the class that do not belong to either the first or the third group, which last, by far the largest, consists of the "secret nostrums," such as "soothing syrups," "female regulators," "blood purifiers," etc.

Incidentally, Dr. Rice justly complains that for years the name of Bellevue Hospital has been taken in vain by a number of persons and firms without any authority whatever. It is a common occurrence, he says, for samples of proprietary medicines, foods, mineral waters, plasters, etc., to be sent to the hospital or to members of the house staff for "trial," whereupon the subsequent advertisements of the articles in question often assert that the latter are "used in Bellevue Hospital," leaving the impression upon the mind of the reader that the article or articles have been used with the sanction of some member of the medical board. It is probably impossible, says Dr. Rice, to find a remedy for this evil, from which many other institutions of repute likewise suffer. To publish a denial of such false assertions, he thinks, would only aggravate the evil. The utmost that can be done appears to be to caution the medical staff against any entanglements with the agents of the interested parties, or encouragement of them.

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The existence of *philippium* is claimed by M. Marc Delafontaine, in the *Chemical News* for May 14, 1897. Its chief characters are described. Its symbol is Pp., and its atomic weight 80, 120 or 160, according to whether the oxide is PpO, $Pp_2O_3$, or $PpO_2$.

Philippium is more closely allied to cerium and terbium than to any other of the yttrium and cerium metals. It is to yttrium what cerium is to lanthanum.

## RECENT LITERATURE RELATING TO PHARMACY.

### PASSION FLOWER, PASSIFLORA INCARNATA, IN EPILEPSY AND OTHER NEUROSES.

S. D. Bullington, M.D. (*Nashville Journal of Medicine and Surgery*, March, 1897), reported some very favorable results from the administration of the fluid extract of passion flower, either alone or in conjunction with other medicines, in a number of cases of nervous disorder.

A case of epilepsy of twenty-six years' standing showed marked improvement after treatment with this drug, although, of course, it was not hoped to effect a cure in a case of so long standing.

Various cases of insomnia, hysteria and neurasthenia were likewise treated with the drug with satisfactory results.

The author stated that the fluid extract, mixed well with water or simple elixir, was pleasant to take, and an admirable substitute for bromide.

Another feature in its favor was that no ill effects seemed to follow its use, either temporary or continued.

### COMMERCIAL GINGER AND ESSENCE OF GINGER.

W. S. Glass (*Pharmaceutical Journal*, March 20, 1897) examined samples of Jamaica, Cochin and African ginger, with a view to obtaining a satisfactory essence. His results are given in the following table, the percentages of oleoresin obtained by three other writers being also given for comparison:

| | Author | | | Thresh. | Siggins.[1] | Riegel. |
|---|---|---|---|---|---|---|
| | Moisture. | Ash. | Extract or Oleoresin. | Extract or Oleoresin. | Extract or Oleoresin. | Extract or Oleoresin. |
| Jamaica | 9·33 | 5·3 | 5·00 | 3·290 | 5·00 | 5 |
| Cochin | 11·00 | 4·6 | 4 33 | 4·965 | — | — |
| African | 8·00 | 5·5 | 6·33 | 8 075 | *A* 6·17<br>*B* 7·00 | — |

[1] Am. Jour. Pharm., Vol. 60, p. 278.

The extract was prepared by exhausting the drug with ether and evaporating at a low temperature. The African variety required most ether and yielded the highest percentage of extract; but, as

stated by the author, this variety was unsuited for many pharmaceutical purposes on account of its brown, coarse appearance.

For the preparation of a soluble essence possessing all the flavor of the ginger it was recommended to add 3 drachms of powdered pumice-stone to 1 fluid ounce of the essence, and shake occasionally during twelve hours. Then add gradually 3 fluid ounces of distilled water; allow the mixture to stand six hours and filter.

REPORT OF COMMITTEE ON ATOMIC WEIGHTS.

The fourth annual report of the Committee of the American Chemical Society on Atomic Weights, has recently been published (*Jour. Amer. Chem. Soc.*, **19**, 359). The chairman, Dr. F. W. Clarke, gives the following illustration of the practical value of a correct knowledge of atomic weights in the commercial world: "There are two rival values for the atomic weights of chromium. One, 52·5 approximately, based on the old work of Berlin, is still used by European analysts. The other, 52·1, depends upon later and more accurate researches, and is used in this country. Mr. William Glenn, of the Baltimore Chrome Works, informs me that that establishment imports chrome iron ore by the shipload, the value being determined by a volumetric assay, in which the atomic weight of chromium is involved. It is assayed in Glasgow, with the older value for chromium, and in Baltimore with the modern datum. A cargo amounts to about 3,500 tons, and the difference in price due to the difference between 52·1 and 52·5 for chromium amounts to about $367.50 per shipload."

The following are the recalculated atomic weights according to the best authorities, compiled down to January 1, 1897:

| | H = 1 | O = 16 |
|---|---|---|
| Aluminum | 26·91 | 27·11 |
| Antimony | 119·52 | 120·43 |
| Argon | (?) | (?) |
| Arsenic | 74·44 | 75·01 |
| Barium | 136·39 | 137·43 |
| Bismuth | 206·54 | 208·11 |
| Boron | 10·86 | 10·95 |
| Bromine | 79·34 | 79·95 |
| Cadmium | 111·10 | 111·95 |
| Calcium | 39·76 | 40·07 |
| Carbon | 11·92 | 12·01 |
| Cerium | 139·10 | 140·20 |
| Cæsium | 131·89 | 132·89 |

| | H = 1 | O = 16 |
|---|---|---|
| Chlorine | 35·18 | 35·45 |
| Chromium | 51·74 | 52·14 |
| Cobalt | 58·49 | 58·93 |
| Columbium | 93·02 | 93·73 |
| Copper | 63·12 | 63·60 |
| Erbium | 165·06 | 166·32 |
| Fluorine | 18·91 | 19·06 |
| Gadolinium | 155·57 | 156·76 |
| Gallium | 69·38 | 69·91 |
| Germanium | 71·93 | 72·48 |
| Glucinum | 9·01 | 9·08 |
| Gold | 195·74 | 197·23 |
| Helium | (?) | (?) |
| Hydrogen | 1·000 | 1·008 |
| Indium | 112·99 | 113·85 |
| Iodine | 125·89 | 126·85 |
| Iridium | 191·66 | 193·12 |
| Iron | 55·60 | 56·02 |
| Lanthanum | 137·59 | 138·64 |
| Lead | 205·36 | 206·92 |
| Lithium | 6·97 | 7·03 |
| Magnesium | 24·10 | 24·28 |
| Manganese | 54·57 | 54·99 |
| Mercury | 198·49 | 200·00 |
| Molybdenum | 95·26 | 95·99 |
| Neodymium | 139·70 | 140·80 |
| Nickel | 58·24 | 58·69 |
| Nitrogen | 13·93 | 14·04 |
| Osmium | 189·55 | 190·99 |
| Oxygen | 15·88 | 16·00 |
| Palladium | 105·56 | 106·36 |
| Phosphorus | 30·79 | 31·02 |
| Platinum | 193·41 | 194·89 |
| Potassium | 38·82 | 39·11 |
| Praseodymium | 142·50 | 143·60 |
| Rhodium | 102·23 | 103·01 |
| Rubidium | 84·78 | 85·43 |
| Ruthenium | 100·91 | 101·68 |
| Samarium | 149·13 | 150·26 |
| Scandium | 43·78 | 44·12 |
| Selenium | 78·42 | 79·02 |
| Silicon | 28·18 | 28·40 |
| Silver | 107·11 | 107·92 |
| Sodium | 22·88 | 23·05 |
| Strontium | 86·95 | 87·61 |
| Sulphur | 31·83 | 32·07 |
| Tantalum | 181·45 | 182·84 |
| Tellurium | 126·52 | 127·49 |

| | H = 1 | O = 16 |
|---|---|---|
| Terbium | 158·80 | 160·00 |
| Thallium | 202·61 | 204·15 |
| Thorium | 230·87 | 232·63 |
| Thulium | 169·40 | 170·70 |
| Tin | 118·15 | 119·05 |
| Titanium | 47·79 | 48·15 |
| Tungsten | 183·43 | 184·83 |
| Uranium | 237·77 | 239·59 |
| Vanadium | 50·99 | 51·38 |
| Ytterbium | 171·88 | 173·19 |
| Yttrium | 88·35 | 89·02 |
| Zinc | 64·91 | 65·41 |
| Zirconium | 89·72 | 90·40 |

## EDITORIAL.

### NEW PROFESSORS IN THE PHILADELPHIA COLLEGE OF PHARMACY.

When it became necessary to fill the vacancy in the chair of Botany and Materia Medica in the College, caused by the death of Professor Bastin, it was decided by the Board of Trustees to create two new chairs in place of the old one. Dr. Clement B. Lowe, already an Instructor in the College, was accordingly nominated to occupy the chair of Materia Medica, and Professor Henry Kraemer, Professor of Botany, Pharmacognosy and Materia Medica in the Northwestern University, of Chicago, to fill the chair of Botany.

Both men are amply qualified, by education and experience, to fill the positions they have been selected to occupy. Dr. Lowe is a graduate of Bucknell University, of the Philadelphia College of Pharmacy and of the Jefferson Medical College. He conducted a pharmacy for a number of years, and has been Instructor and Quiz Master in the College for over ten years.

Professor Kraemer is a graduate of Girard College, of the Philadelphia College of Pharmacy, of the School of Mines, Columbia College, New York, and of the University of Marburg, Germany, where he received the degree of Doctor of Philosophy. His thesis for this degree was an elaborate study of Viola tricolor. He likewise had several years' experience in the retail drug business. In addition to his lectures on botany, Professor Kraemer will conduct the Botanical Laboratory so successfully organized by Professor Bastin.

Dr. J. L. D. Morison will become Instructor in Materia Medica, in addition to his present position as Assistant in the Botanical Laboratory.

## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Einführung in das Studium der Alkaloide, mit besonderer Berücksichtigung der vegetabilischen Alkaloide und der Ptomaine. Von Dr. Icilio Guareschi, O. Ö. Professor an der königl. Universität Turin, und Director des pharmaceutisch-chemischen und toxicologischen Instituts. Mit Genehmigung des Verfassers in deutscher Bearbeitung herausgegeben von Dr. Hermann Kunz-

Krause, Dozent für allgemeine und pharmaceutische Chemie an der Universität Lausanne. Zweite Hälfte, Berlin, 1897. R. Gaertner's Verlagsbuchhandlung, Hermann Heyfelder.

The first half of this valuable work was reviewed in this JOURNAL for February of this year. It may be well to repeat what was pointed out at that time, in regard to the sections into which the whole work is divided, viz.:

I. Bases of the Open Chain Series.

II. Bases of the Closed Chain Series.

III. Metal Amines.

IV. Alkaloids in the Narrower Sense.

V. Ptomaines and Leucomaines.

The first half, in addition to the historical introduction, included all of the open chain series and a part of the closed chain series. The second half covers all the remaining sections, in addition to completing the consideration of the closed chain series. The fourth section is one of the most important in the whole work, since it very fully considers the natural alkaloids, their distribution in the vegetable kingdom, method of extraction, estimation, etc. It also contains a tabular list of the alkaloids, with their sources, according to natural orders, and their formulas; this section is also enriched by a number of paragraphs from the pen of the translator. As now completed, the book consists of 657 large pages, including an index. It is an indispensable work to every one who has to do with the alkaloids in any of their varieties.

REAGENTS AND REACTIONS known by the names of their authors. Based on the original collection by A. Schneider, revised and enlarged by Dr. Julius Altschul for the *Pharmaceutische Centralhalle*. Translated from the German by Richard Fischer, Instructor in Pharmacy at the University of Wisconsin. Pharmaceutical Review Publishing Company, Milwaukee, Wisconsin. 1897.

The difficulty experienced by many chemists in determining the nature of a reagent when, as is frequently the case, the name of the author only is given, is reason enough for issuing a work like this. The list as now published is very complete, and occupies 82 pages. There is an index of subjects given at the end which will materially assist locating certain tests. The pamphlet is well printed, and appears to be remarkably free from errors.

WARNER'S POCKET MEDICAL DICTIONARY OF TO-DAY, comprising the pronunciation and definition of 10,000 essential words and terms used in medicine and associated sciences. By William R. Warner. Philadelphia: William R. Warner & Co. 1897.

The foregoing title sufficiently explains the scope of this work. By omitting the very common terms, whose meaning is obvious or known to everybody, the author has been able to gain space and so keep the book down to his original intention, thereby making it strictly a pocket dictionary. It is a very complete list of words and their definitions, which are especially desired by both physician and pharmacist.

FORMALDEHYDE. By Eli Lilly & Co. Indianapolis. 1897.

This pamphlet is devoted to a description of the chemistry of formaldehyde, its use as a disinfectant, and its generation in the Moffatt Formaldehyde Lamp, which was fully described and illustrated in the April number of this JOURNAL.

THE PHARMACOLOGIST is the title of a quarterly journal devoted to Materia Medica, Pharmacy and Therapy. It is edited by F. E. Stewart, M.D., Ph.G., and published by Frederick Kimball Stearns, of Detroit, Mich. The first number, recently issued, is full of interesting matter. It contains comments and editorials on a variety of subjects, and two original communications, one on Aconite and another on Diastatic Ferments.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO. (Fritzsche Brothers.) Leipzig and New York, April, 1897.

This number is superior in many respects to its predecessors. After the usual information in regard to a large number of oils, the following novelties are noted : Cardamom oil, Bengal Schinus (pepper-tree) oil; Valerian oil, Mexican; camphor-wood oil, Venezuelan; and golden-rod oil, Canadian.

The latter half of the Report is devoted to a list of essential oils, giving their botanical origin, the part or products of the plant from which the oil is obtained, the yield and the physical constants and principal chemical constituents of each oil. This is especially useful for reference. A map is appended, showing the producing districts of oil of peppermint (menthol) and camphor in Japan.

PROCEEDINGS OF THE TWENTIETH ANNUAL MEETING OF THE PHARMACEUTICAL ASSOCIATION OF THE STATE OF SOUTH CAROLINA.

The twentieth annual meeting of this association met in Columbia, S. C., November 11, 1896. A good number of original communications in the form of addresses were delivered.

STROPHANTHUS; A CLINICAL STUDY. By Reynold W. Wilcox, M.D., LL.D. From the *American Journal of the Medical Sciences*, May, 1897.

The author is of the opinion that the variety Kombé is a distinct species. The present report is confined to a clinical study of the tincture made from Strophanthus Kombé; the author reserves for another occasion the presentation of similar studies upon what he believes to be four absolutely independent species of strophanthus.

ZUR PRÜFUNG DES CHININS. Von O. Hesse, from *Archiv. der Pharm.*, 135 114, 1897. This is a subject on which Dr. Hesse is especially well fitted to speak.

NATURAL HISTORY CHARTS AND ILLUSTRATIONS. By John W. Harshberger, Ph.D. Reprinted from *Education*, April, 1897. Dr. Harshberger gives some valuable suggestions on the best means of conducting a short course on botany.

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# PHARMACEUTICAL ASSOCIATIONS.

## PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The twentieth annual meeting of this Association will be held in the Kittatinny Hotel, Delaware Water Gap, commencing Tuesday, June 22d, at 3.30 P.M.

The Delaware Water Gap is so delightfully situated, and so easily reached,

especially by members living in the eastern part of the State, that a large number will no doubt avail themselves of this opportunity for a few days' recreation and enjoyment.

The Trunk Line Association has granted permission to the railroads running to the place of meeting to sell tickets at a rate of two cents per mile. Orders for these tickets can be had on application to the Secretary, J. A. Miller, Harrisburg, Pa. The hotel will furnish entertainment at $2.65 per day.

The Entertainment Committee will have a programme ready at the time of the meeting that will please everybody.

### NEW YORK STATE PHARMACEUTICAL ASSOCIATION.

The nineteenth annual meeting of this Association will be held at Manhattan Beach, commencing Tuesday, July 13, 1897. The Committee on Pharmacy and Queries is very desirous of presenting a large number of papers on topics of scientific, technical and trade interest, and is making direct appeals to the members who have occasionally demonstrated their ability to prepare papers on subjects of interest to the pharmacists of the State. A list of queries has been prepared, which embodies suggestions that should appeal to every working pharmacist in the Association.

The meeting promises to be a splendid success so far as social features are concerned, and the Committee on Pharmacy and Queries is determined to make the pharmacy section of the meeting an interesting and valuable feature of it. With this object in view members are urged to select one or more subjects from the list of queries and prepare papers thereon. Albert H. Brundage, Ph.G., M.D., Chairman, 1153 Gates Avenue, Brooklyn, should be addressed on all matters relating to papers and queries.

### THE ARKANSAS ASSOCIATION OF PHARMACISTS.

The Association met in annual session on May 11th, 12th, 13th, in Little Rock. The attendance was not large, but was very enthusiastic, and the meeting was a very entertaining and successful one. Ten new members were added to the list, which now numbers 175, consisting of many of the most influential pharmacists in the State.

President Sparks read his annual address, which was referred to a committee on distribution. The treasurer's report showed a balance on hand of $293.91. The president appointed a committee of three, consisting of Dr. Bond, Mr. R. B. King and Dr. John W. Morton, to convey the fraternal greetings of the Association to the Arkansas Medical Society, which was in session in this city.

During the session a number of interesting papers were read, among which were the "Future Supply of Coal," by Mr. R. B. King, of Helena. This paper, which shows that there can be no dearth in the coal supply of the world, was referred to the Committee on Publication. Mr. Ginnochio treated the "Influence of Moisture on Drugs" very instructively.

The report of the Secretary of the Arkansas Board of Pharmacy was read by Dr. Bond. It showed a registration of 28 during the last year, and a total registration of 921. Graduates of reputable Colleges of Pharmacy and licentiates of some of the State Boards are occasionally recognized by our Board.

The query box afforded much interesting and instructive discussion.

A display of chemicals made by Mr. Germain, of Fort Smith, attracted much attention, particularly the dry chemicals. The prize for Pharmaceutical display was awarded to him.

The special committee appointed to convey the fraternal greetings of this body to the Medical Society reported they had been received in a very cordial manner, and invited to address that body, which invitation was accepted, and much gratification was expressed by the physicians for the visit and the address.

The following gentlemen were elected officers for the ensuing year:

Mr. J. F. Dowdy, Little Rock, President.

Dr. H. C. Johnson, Van Buren, First Vice-President.

Dr. J. W. Morton, Fort Smith, Second Vice-President.

Mr. John B. Bond, Jr., Little Rock, Secretary. Re-elected.

Mr. J. A. Jungkind, Little Rock, Treasurer. Re-elected.

Mr. Dowdy, being elected president, made a vacancy in the Executive Committee, which was filled by the election of Mr. Shachleiter.

After some discussion, it was agreed that the next meeting should be held in Little Rock on the second Tuesday in May, 1898.

On motion of Dr. Bond, it was ordered that the president, secretary and treasurer should compose the Publication Committee.

No further business appearing, the new officers were severally installed, and the meeting adjourned.

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## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, May 18, 1897.

The last Pharmaceutical Meeting of the present series was held in the Museum of the College at 3.30 P.M. Mr. F. W. E. Stedem presided. The reading of the minutes of the previous meeting was omitted.

An interesting paper on "Yerba del Pollo," by Prof. Alfonso Herrera, of Mexico, was read by Prof. Henry Trimble (see page 290).

The usefulness of this plant as a remedy in medical practice, and as affirmed by the writer, dates back to the time of the Aztecs, it having been employed by them in the treatment of several diseases. But when their power was overcome it was forgotten, together with other useful products of their country. Nearly three centuries elapsed before it again attracted the attention of investigators, and it has been only within the latter half of this century that any considerable study has been given to it. It is valued chiefly as a hemostatic, although, as stated by the writer, there seems to be some difficulty in determining to what constituent this property is due.

"On the Occurrence of Strontium in Plants" was the subject of a somewhat timely paper presented by Prof. Henry Trimble (see page 296).

The author had discovered strontium in a number of samples of bark from different species of Castanopsis growing at Singapore, India, while a sample of American Castanopsis growing in California gave no indication of the presence of this metal. Two samples of oak and one of mangrove from India also contained strontium. A comparison of the data so obtained led the writer to believe that the presence of strontium salts in the samples from Singapore was due to the composition of the soil in that country.

Prof. Samuel P. Sadtler referred to the use of strontium hydrate in sugar refining, and to the objectionable feature of its cost when first suggested for this purpose, on account of the limited supply of the minerals of strontium. The discovery of other mines since then had had their influence in decreasing the cost of the metal, and in regard to its occurrence in India he thought it probable that the government or mining reports would give some information.

Professor Trimble replied that the government officials reported only a trace of strontium salts in the Singapore soil.

A paper, entitled a "Note on Red Mercuric Oxide," was contributed by Mr. J. W. England (see page 311). This was intended as a reply to the criticisms presented by Mr. Charles H. LaWall, at the meeting last month, on citrine ointment. The principal remarks of the author were on the question of the relative purity of red mercuric oxide and metallic mercury, and the advisability of substituting the former for the latter in the formula for citrine ointment, as a matter of convenience. His information in regard to the purity of these substances did not accord with Mr. LaWall's statement concerning them, and in evidence of this, extracts from letters from three firms of manufacturing chemists were presented.

Mr. Lyman F. Kebler casually made reference to a subject which had recently been brought to his notice. He said that a resinous substance, which had been applied to the trunks of some of the trees in the public squares of this city to serve as an obstruction to insects, had been found to be harmful to the trees. In experimenting with solvents with the object of removing it, he found acetone to answer the purpose most effectually.

Some specimens and other objects added to the interest of the meeting as follows:

A curious specimen of a growing plant of Japanese cultivation was loaned by Mr. Howard B. French. It belonged to the natural order Coniferæ, and in outline strikingly resembled a fowl, the fictitious name "Ibis firma" being significant of this.

A copy of letters patent, which was an elaborate and formidable document, granted during the reign of George II of England, for a medicine "Oleum Anodinum," was presented by Mr. Chas. Bullock.

Professor Trimble called attention to a large specimen of canaigre root, showing the influence of cultivation, and to one of natural growth, much smaller in size, both of them having grown at Rialto, California.

Among the samples was one of calcium carbide, presented by Mr. J. O. McHenry, of this city.

An improved attachment for the "Moffatt Formaldehyde Generator," presented by the agents, Messrs. Eli Lilly & Co., of Indianapolis, Ind., was exhibited.

The chairman believed in the efficacy of the apparatus as a disinfecting agent, but said that, in order to insure the generation of the gas, it was necessary to carefully adjust the wick.

On motion, the meeting adjourned.

THOS. S. WIEGAND, *Registrar.*

// THE AMERICAN
JOURNAL OF PHARMACY

*JULY, 1897.*

# THE CALIFORNIA MANNA.[1]

BY JOHN URI LLOYD, PH.M.

MENTIONED BY FATHER PICOLO. (*With a summary.*)

*Query* by Prof. Flückiger:

"What was the manna mentioned by one Father Picolo in California and alluded to by Proust, in *Ann. d. Chim.*, 57 (1806), p. 145?"

*Answer* by John Uri Lloyd.

DEAR PROF. FLÜCKIGER:—I find, on reference to the paper cited, that the statement is as follows:

Proust. *Ann. d. Chim.*, 57, p. 145. On the Sugar of the Grape.

The manna seems to abound in America, according to the reports of travellers. Herera says: "It falls in the season in the quantity of a dew, which congeals like sugar, and which is so wholesome that it is named Manna. Father Picolo, one of the first

[1] When Prof. Flückiger visited America (July, 1894) he hoped to obtain historical data that would enable him to give the records of several interesting American productions. In this he failed, and he then associated in his behalf the services of the author of this paper. After much of the work had been done, the death of Prof. Flückiger interrupted the investigation.

These papers (some of them) passed into possession of Prof. Ed. Schaer, of the Strasburg University, who translated into German the accompanying work by Professor Lloyd on American Manna, for the pages of the *Berichte der deutschen pharmaceutischen Gesellschaft*.

We present herein, with the knowledge and consent of Prof. Schaer and the author, the original paper on American Manna.—Editor AM. JOUR. PHARM.

spiritual conquerors of California, assures us that it exudes in considerable amounts from the shrubs (arbrisseaux) in April, May and June."

It will be shown hereafter that this is not a literal abstract from the original source, where the word *roseaux* is used instead of the word *arbrisseaux*.

In tracing this subject, first the biography of Father Picolo presents itself as follows:

### BIOGRAPHY OF FRANÇOIS MARIE PICOLO.[2]

Abstracted from Bibliothèque des Écrivains de la Compagnie de Jésus, Liège A. Lyon, 1872, p. 1957.

"Picolo, François Marie, a Sicilian Jesuit, was born in Palermo, March 24, 1654, entered the Society of Jesus in 1673, and made the four vows in Mexico in 1689. He founded the Mission of Jesus of Carichic, where he resided for fourteen years, and afterwards united with Father Jean de Salvatierra in order to open the missions in California.

"After a stay of forty years with the missions, he received the reward of his toil on February 22, 1729."

His writings, as far as known to me,[3] are contained in the following communication:

"Memoir, with regard to the conditions of the missions lately established in California, by the Fathers of the Society of Jesus; presented to the Royal Council of Guadalaxara, in Mexico, February 10, 1702, by Father François Marie Picolo, of the same society, and one of the original founders of this Mission."

This memoir of F. M. Picolo is reprinted literally in *W. I. Kip's Historical Scenes from the old Jesuit Missions*, New York, 1875, which is an abstract of American topics from the following work:

"*Lettres Édifiantes et curieuses, écrites des Missions Étrangères, in 47 volumes, containing the letters of the Jesuit missionaries from about 1650 to 1750*," this collection being purchased by W. I. Kip from the library of the Bishop of Durham.

Speaking in Chapter II, Missions in Lower California, 1702, he states, p. 57, *in the months of April, May and June, a kind of manna*

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[2] Thanks are extended St. Xavier's College, Cincinnati, for library courtesies, thus enabling this biography to be presented.

[3] J. U. L.

*falls with the dew, which congeals and hardens on the leaves of the reeds*[4] (*roseaux*) *from which it is gathered. I have tasted it. It is a little darker than sugar, but has all its sweetness.*"

Endeavoring to identify Father Picolo's manna, the following reference to manna-like bodies (false mannas) was noted in the U. S. Dispensatory, 17th Ed., Philadelphia, 1894, p. 850, which, however, are not the same manna as that of Picolo.

"*American False Manna.* A substance resembling manna, of a sweet, slightly bitter, and terebinthinate taste, and actively purgative, exudes from incisions in Pinus Lambertiana of Oregon, and is used by the natives." (Nar. of U. S. Expl. Exp., v. 232.)

"M. Berthelot has abstracted from this product a peculiar saccharine principle which he calls 'pinite.'" (See A. J. P., vol. 28, p. 157.)

The strongly cathartic properties of this manna of the pinus and its resemblance to manna are emphasized in the following description of this substance:

I. Wilkes, *Narrative of the U. S. Exploring Exped.*, Philadelphia, 1850, Vol. 5.

P. 232. Speaking of the Pinus Lambertiana, which they found frequently when crossing the Umpgua Mountains in Southern Oregon. "Some of the sugar produced by this tree was obtained; it is of a sweet taste, with a slightly bitter and piny flavor; it resembles manna, and is obtained by the Indians by burning a cavity in the tree, whence it exudes. It is gathered in large quantities.

"This sugar is a powerful cathartic, and affected all the party who partook of it; yet it is said that it is used as a substitute for sugar among the trappers and hunters."

II. John S. Newberry, botanist in charge of the U. S. Pacific R. R. Surveys, California and Oregon. *Botanical Report*, 1855, p. 44. *On the Pinus Lambertiana, the Sugar Pine.*

"The resin of the sugar pine is less abundant than that of the P. ponderosa; is white or transparent like that of P. strobus.

"That which exudes from partially burnt trees, for the most part, loses its terebinthine taste and smell, and acquires a sweetness nearly equal to that of sugar.

"This sugar gives the tree its name, and is sometimes used for

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[4] *Roseaux*, in the original *Lettres édifiantes*, etc., Tome V, p. 264. Kip's translation, is literal, as we have verified from the original letter.—J. U. L.

sweetening food. It has, however, decided cathartic properties, and is oftener used by the frontier men as a medicine than a condiment.

"Its resemblance in taste, appearance and properties to manna strikes one instantly; and but for a slight terebinthine flavor, it might be substituted for that drug without the knowledge of the druggist or physician, its physical and medical properties are so very like."

It is not possible that Father Picolo refers to the sugar from these trees, as he failed to record any cathartic properties as an attribute of his sugar; furthermore, the manner which he describes of collecting the sugar hardly conforms to the description just given as to the manner of collecting it from these trees. It is most probable, according to his brief statement on the subject (for he mentions it as occurring "on the leaves of the reeds"), that high trees carrying sugar in their sap are out of question, although such sugar trees were not unlikely to have been met by him. For example, also, (*white maple*, *Acer macrophyllum*, see appended list of references, No. 8).

*Only reed grasses* are likely to come into consideration with the manna of Picolo, and of these we have recorded as follows:

(1) *Manna grass*, Glyceria. This seems to be out of the question, as text-books on botany (Gray, etc.) state that the name, denoting sweet, is given in allusion to the taste of the *grain*.

(2) *Phragmites communis, Trin.* Described by *U. S. Geological Exploration of the 40th parallel.* C. King, 5th vol. Botany. S. Watson, p. 390.

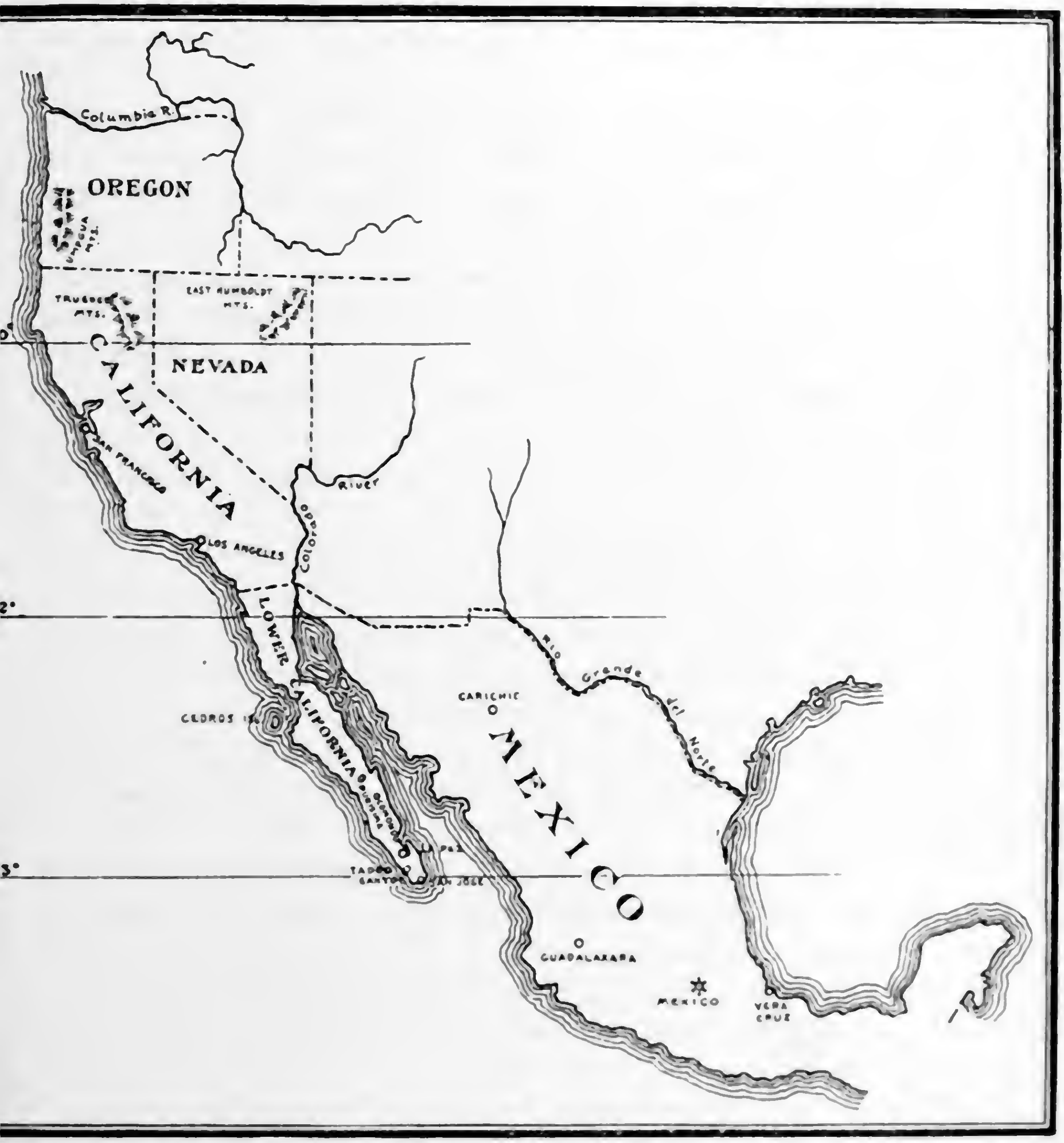
"Found from Florida to Canada and westward to the Pacific. On the banks of fresh-water streams and springs from the Truskee to the East Humboldt Mountains, Nevada, 4–6000 feet altitude. Sugar is said by Durand and Hilgard[5] to be extracted from the stalks of this grass by the Indians, but the scanty juice is not at all saccharine.

"A sweet secretion, however, is sometimes formed upon it in considerable quantity by aphides, as well as upon the leaves of *cottonwood* and *other trees*, and is collected by both the Utes and the Mormons."

If this is correct [there is no higher authority to be found than

[5] *Pacific R. R. Surveys, Bot. Rep.* By Durand and Hilgard, Washington, D. C., 1855, p. 15.

Sereno Watson], the "manna" observed to form on these plants is the secretion of an insect and *not* an exudation from the plant. *Phragmites communis*, thus far, comes nearest the plant described by Father Picolo.




All the plants cited before were found to occur in locations altogether different from the locality where Father Picolo made his observations, which does not, however, preclude them from his territory.

(See accompanying map.)

Father Picolo's range of observation never extended north of Lower California, and, on the other hand, the information we have of this California (which is really a part of Mexico) is rather scant.

The following publications present two sources of information on Lower California:

*First: J. Ross Browne, Resources of States and Territories West of the Rocky Mountains, New York, 1869, with an appendix, p. 630, on Lower California, and with an historical addition, a Sketch of the Settlement and Exploration of Lower California, by Alex. S. Taylor.*

The *Description of Lower California* by J. Ross Browne, contains the following passage:

Page *637*, "Fields of sugar cane are too common to excite remark, and the manufacture of sugar is one of the most important interests of the southern part of the peninsula. * * * The cane fields extend as far as the eye can reach from San José." (This place is situated at the extreme southern coast.) "Sugar mills in Comondu * * * sugar exported in Purisima." This does not refer to the manna under discussion, and it will be mentioned later that this sugar cane is not indigenous, but was imported by later settlers.

*Second: Encyclopædia Britannica, ninth ed.* On California; makes mention of Lower California also, introducing it as follows:

"The interior of Lower California is chiefly known to us as to its physical and geological structure, from a reconnoissance made by *Messrs. Gabb and Loehr of the State Geological Survey of California, in 1867.* "This exploration was set on foot in order that some information might be obtained relative to the value of a concession made by the Mexican Government to an American company. This grant was expected to lead to a settlement of the country, but the whole thing turned out a failure."

The work referred to, *The State Geological Survey of California in 1867 in charge of Messrs. Gabb and Loehr*, is unfortunately not at our command, and may possibly name that "reed" which yielded sugar, as observed by Father Picolo.

However, the first-named book, by J. Ross Browne, in its second part, *A Sketch of the Settlement and Exploration of Lower California*, by Alex. S. Taylor, that appeared in 1869, makes mention of the exploration of Lower California that had taken place in 1867 by Messrs. Gabb and Loehr, under the direction of Mr. J. Ross Browne, the results of which, however, were not then published.

Mr. J. Ross Browne, however, gives a general outline of this exploration, based on detailed letters he received from Mr. Gabb while on his exploring tour.

*P. 66*, a description of vegetation in Lower California is given, which may be condensed as follows:

"*Agaves* (century plant) are also abundant, may be useful in the future to extract spirits from the root. * * * *Acacias*, palms with edible fruits, coniferæ, oaks, wild plums, cottonwoods, sycamores, willows, elder. The Arabian date palm, introduced by missionaries, is thriving. *The sugar cane has been cultivated for more than a century*, and yields a sugar as strong and as sweet as that of Peru, and very abundant in juice."

*P. 82.* Letter of Mr. Gabb to Mr. J. Ross Browne, May, 1867: "At Santiago, there are extensive plantations of sugar cane, and a sugar mill was in active operation. The process throughout is of the most primitive kind, but the result is a very palatable sugar moulded into cakes somewhat like maple sugar, and known as panoche." "Sugar industry * * * also at Todos Santos."

P. 143 of J. Ross Browne, Sketch and Settlement of Lower California. *Report of Dr. John A. Veatch on Carros or Cedros Island*, p. 152, *Soil and Productions*, pine trees.

"The two interesting species of Rhus (R. Lentiana and R. Veatchiana) form marked features in the island flora, the former for the delicious acid exudation of its fruit." * * *

"A beautiful, yellow-flowered agave or aloe plant, about 12 feet in height, with a stem from 4 to 6 inches diameter at the base, branching and spreading at the top and terminating in a profusion of golden blossoms, was tolerably abundant. The flower cups were filled with a fragrant, sweet liquor."

The same book of J. Ross Browne points to a *third source of information on Lower California;* this, however, was not obtainable in the original.

*P. 155, Extracts from a history of Old or Lower California. A posthumous work written originally in Spanish by Padre Franc. Jav. Clavijero, of the Society of Jesus. Translated into Italian, Venice, 1789, and back again into Spanish by Nicolas Garcia de San Vicente (Juan R. Navarro, editor), 1852, was translated into* ENGLISH BY A. G. RANDALL, *Secretary and Translator of the Lower California Company's Exploring Expedition, San Francisco, May, 1867.*

P. 164 of J. Ross Browne's Book, *loc. cit.*, says, as bearing on our subject:

"In some parts there grows, near running streams, reed grass, of the thickness of the little finger.

"THIS LITTLE REED IS THE ONLY PLANT IN CALIFORNIA IN WHICH MANNA IS FOUND. At the present time there are large growths of this imported from abroad."

*Biography of Francisco Javier Clavijero.* Taken from Bibliothèque de la Compagnie de Jésus. Tome II, Bruxelles and Paris, 1891, p. 1210.

*Francisco Javier Clavijero*, born in Vera Cruz, on the 9th of September, 1731. Was received in the province of Mexico, February 13th, 1748. He taught rhetoric in Mexico, philosophy at Valladolid and at Guadalaxara in New Spain. He was exiled and deported to Italy, and died at Bologna April 2, 1787.

Historia de la Antigua a Baya California. Obra posthuma del padre Francisco Javier Clavijero de la compañia de Jesus.

[NOTE.—Some time after this paper was placed in the hands of Professor Flückiger, the following information was found in the Lloyd Library, and a copy at once forwarded to Prof. Ed. Schaer, Strasburg, for the purpose of supplementing the present paper.

From the U. S. Agricultural Report for 1870, *Food Products of the North American Indians*, p. 423, "Bent grass (Arundo phragmites)" (which is a synonym for Phragmites communis, Trin.).

"This species of reed, which grows abundantly around St. Thomas, in southern Utah, during the summer months, produces a kind of white, sweet gum. The Utah Indians cut down the reeds and lay them in piles on blankets or hides, and let them remain for a short time to wilt, when the bundles are beaten with rods to release the gum. The small particles so detached are pressed into balls to be eaten at pleasure. It is a sweet, manna-like substance."

In the returned manuscript we find a foot-note by Professor Schaer, giving the substance of the foregoing quotation, which Professor Flückiger had gathered from the same authority while he was in Brooklyn.]

SUMMARY.

Sugar and two kinds of "manna" are described in Western literature.

1st, *Sugar.* Sugar was derived from the sugar cane, which wa

introduced into Lower California at least one hundred years ago. This was not "manna."

2d, *Father Picolo's Manna.* Father Picolo observed a saccharine deposit on a species of grass that he called reeds (roseaux) and not shrubs (arbrisseaux) as Proust recorded the word. Of the plants likely to have yielded this manna, the *reed grasses* only are to be considered. Of the reed grasses, Phragmites communis undoubtedly answers all the conditions that are cited by Father Picolo, and in my mind this plant is the origin of Picolo's Manna. This manna is (or was recently) still collected by the Indians.

3d, *Manna of the Pinus.* This is yielded by *Pinus Lambertiana* of Oregon, and is cathartic as well as sweet, but no evidence exists to indicate that Picolo had any knowledge of its existence.

*Finally*, I would decide that without question Father Picolo described, as he saw it, the saccharine deposit on *Phragmites communis*, which, according to Watson, is caused by aphides.

REFERENCES ON THE SUBJECT OF FATHER PICOLO'S MANNA.

(1) PROUST, *Ann. d. Chimie*, 57 (1806), p. 145, mentioning Father Picolo and his manna; this occurring on "arbrisseaux" shrubs.

(2) *Bibliothèque des Ecrivains de la Compagnie de Jésus*, Liège & Lyon, 1872, p. 1957. Biography of Father Picolo, and mentioning his "Memoir."

(3) *Lettres édifiantes et curieuses, écrites des Missions étrangères*, in 47 volumes, containing the letters of the Jesuit missionaries from about 1650-1750. Translated from the Spanish, Vol. V, p. 264. Containing the memoir of Father Picolo, mentioned under 2 in French, manna occurring on "roseaux" reeds.

(4) W. I. KIP, *Historical Scenes from the old Jesuit Missions*, New York, 1875, p. 50. Containing the "memoir" of Father Picolo, literally translated into English.

(5) *U. S. Dispensatory*, seventeenth edition, Philadelphia, 1894, p. 850. On American False Manna. From Pinus Lambertiana, Sugar Pine. Points to Reference No. 6.

(6) WILKES, *Narrative of the U. S. Exploring Expedition*, Philadelphia, 1850, Vol. V, p. 232. On Pinus Lambertiana. The sugar has strongly cathartic properties.

(7) JOHN S. NEWBERRY, botanist in charge of the U. S. Pacific R. R. Surveys in California and Oregon, 1855. *Botanical Report*, p. 42. Describing Pinus Lambertiana and corroborating statement in Reference No. 6.

(8) J. G. COOPER, botanist in charge of the U. S. Pacific R. R. Survey Route near the 47th and 48th parallels, explored by I. I. Stevens, 1853-55. *Botanical Report*, No. 1, p. 28. Mentions *White Maple*, Acer macrophyllum, as containing sugar in its sap.

(9) ASA GRAY and others. *Botany*. Manna grass, sweet principle is contained in the grain.

(10) SERENO WATSON, botanist in charge of U. S. Geological Exploration of

the 40th parallel, under C. King, 5th Vol. *Botany*, p. 390. On *Phragmites communis*. Reed-sap not saccharine. Aphides cause sweet secretions on its leaves and those of cottonwood and other trees.

(11) DURAND AND HILGARD, Pacific R. R. Survey. *Botanical Report*, Washington, D. C, 1855, p. 15. The Indians are said (by D. and H.) to extract sugar from Phragmites communis. This seems to be contrary to the statement in Reference 10.

(12) J. ROSS BROWNE. *Resources of States and Territories west of the Rocky Mountains*, New York, 1869, (*a*) with an appendix, p. 630, on Lower California, and with an historical addition, (*b*) A sketch of the settlement and exploration of Lower California, by Alex. S. Taylor. In 12 (*a*) it is mentioned that sugar cane abounds in Lower California; 12 (*b*) contains further references.

(13) *Encyclopædia Britannica*, 9th ed. On California, also on Lower California, points to Reference No. 14.

(14) GABB AND LOEHR, with the State Geological Survey of California in 1867. The original was not accessible. A brief excerpt is contained in Reference 12 (*b*), p. 66.

(15) Report of JOHN A. VEATCH, *On Carros or Cedros Island*. Original not accessible. Brief excerpt is to be found in Reference 12 (*b*), p. 152. Mentions an "agave," which contains a sweet liquid in its flowering cups.

(16) *Extracts from a History of Old or Lower California*. A posthumous work, written originally in Spanish by *Padre Franc. Javier Clavijero*, of the Society of Jesus. Translated into Italian, Venice, 1789, and back again into Spanish by Nicolas Garcia, de San Vicente (Juan R. Navarro, editor), 1852. Was translated into English by A. G. Randall, Secretary and Translator of the Lower California Company's Exploring Expedition, San Francisco, May, 1867. Original not accessible. An abstract to be found in 12 (*b*), p. 164. It states that there is a reed growing in Lower California near running streams that yields manna.

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## CORROSIVE SUBLIMATE IN CALOMEL.[1]

BY LYMAN F. KEBLER.

The 1890 U.S.P., among other requirements, describes calomel as "A white, impalpable powder, showing only small, isolated crystals under a magnifying power of 100 diameters. Insoluble in water, alcohol or ether. In contact with calcium hydrate T. S., the salt is blackened. If 1 gramme of the salt be shaken with 10 c.c. of water or alcohol, the respective filtrates should not be affected by hydrogen sulphide T. S. or silver nitrate T. S. (absence of *mercuric chloride*)."

Several years ago the writer received a sample of calomel that gave a prominent yellow coloration when treated with lime-water. Yellow wash instead of black wash, if you please. The question immediately arose—is it possible that any manufacturer will put such a valuable medicinal agent as calomel on the market containing such an apparent quantity of corrosive sublimate? Further exami-

[1] Presented at the meeting of the *Penna. Pharm. Assoc.*, June, 1897.

nation showed that the calomel contained an appreciable quantity of this poisonous agent. Other makes were secured and all developed a greater or lesser yellowish coloration when treated with lime-water. The various available products were then critically examined according to the U.S.P. requirements, with the following results: The color varied from a white to a decided cream. Isolated broken crystals were present in all material examined. Minute traces of mercuric chloride were indicated in every instance.

Since examining the above samples the writer has watched the quality of this article with much interest; but thus far all efforts have failed to find a calomel absolutely free from corrosive sublimate when the U.S.P. tests were rigidly applied. In two cases, however, both the silver nitrate and the hydrogen sulphide failed to give absolute evidence of the mercuric chloride, but a transitional yellow was developed with even these when treated with lime-water. One of these was a beautiful crystalline (plates) product of Japanese origin, the other an old sample found in the laboratory.

Several questions arise in this connection. First, the yellowish coloration, and second, the relative solubilities of mercurous chloride, silver chloride and mercurous sulphide.

It is well known that the color of the various compounds of mercury is readily modified. In precipitating mercuric mercury with hydrogen sulphide, the resulting product frequently varies in color from white to black. The writer on several occasions has repeatedly washed calomel with water, to remove the soluble mercury compounds, but in every instance a yellowish coloration was developed at the point of contact, when the washed calomel was treated with lime-water. This would suggest the conclusion that calomel develops a transitional yellowish coloration at the point of contact when treated with lime-water.

The second question, viz.: the relative solubility of the above-named compounds, is an interesting one. We are informed by the Pharmacopœia, and other standard works, that calomel is *insoluble*. Silver chloride and mercurous sulphide are generally considered insoluble. According to A. M. Comey's "Dictionary of Chemical Solubilities" calomel and silver chloride are *nearly* or *almost* insoluble in water, while mercurous sulphide is *insoluble*.

F. Kohlrausch[1] and F. Rose, calculating from the electrical con-

[1] 1893, *Ztschr. phys. Chem.*, **12**, 241.

ductivity of calomel in water, at 18° C., have found that 1 litre of water dissolves 3·1 mg. of mercurous chloride. The same authorities,[2] by the electrolytic method, have found that 1 litre of water, at 18° C., dissolves 1·52 mg. of silver chloride. The difference of the relative solubilities of silver chloride and mercurous chloride is 1·58 mg. per litre. According to these experiments, there would be formed a certain amount of silver chloride, when a saturated aqueous solution of calomel is treated with silver nitrate. When we remembered that one part of silver can be detected in 800,000 parts of water, it can readily be seen why calomel is so often reported as containing corrosive sublimate.

Then again, if mercurous chloride is soluble at all in water, and mercurous sulphide is insoluble in the same menstruum, it naturally follows that hydrogen sulphide will produce a reaction with a saturated aqueous solution of calomel.

According to the writer's observations, calomel is nearly as soluble in alcohol as in water, but is insoluble in ether; at least, an alcoholic solution of calomel frequently gives a reaction with hydrogen sulphide, while an ethereal solution will not leave a residue when evaporated in a pure atmosphere.

While it is impossible to countenance any laxness in a matter of this kind, still the writer is of the opinion that the official requirements are slightly too rigid. As the matter now stands, the analyst must practically take it upon himself, if he reports favorably on any material submitted, or he must reject every sample submitted to him. Calomel does occasionally contain corrosive sublimate, and it is necessary to keep a strict surveillance over this product. But according to the most rigid tests, with the above noted exception, all calomel examined by the writer during the past few years has not contained over $\frac{1}{100000}$ of 1 per cent. of corrosive sublimate.

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*Volatile oil of lovage*, according to E. Braun (*Archiv der Pharm.*, **235**, 1), contains (*a*) a terpene, $C_{10}H_{16}$, resembling limonene, but not giving crystalline compounds with the halogen acids; (*b*) cineol, $C_{10}H_{18}O$; (*c*) isovalerianic acid; (*d*) acetic acid, as an oxidation product; (*e*) benzoic acid. The oil commences to boil at 170°, and begins to decompose at 200° C.

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[2] 1893, *Ibid.*, **12**, 242.

# ANALYSIS OF THE ROOT OF KALMIA LATIFOLIA.

By Harry Matusow, Ph.G.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 168.

This plant is a well-known evergreen of the natural order Ericaceæ, and is known under the various synonyms of laurel, mountain laurel, broad-leaved laurel, calico bush and spoonwood. It inhabits all sections of the United States, from the Atlantic Ocean to the Mississippi River, being especially abundant on the sides of hills and mountains. It is a shrub, from three to ten feet in height, and bears beautiful flowers.

The leaves of the plant are said to possess poisonous properties, due to andromedotoxin, which is found in a number of plants belonging to the Ericaceæ. As far as was learned, the root has not been previously examined; so in order to ascertain its constituents, a quantity of the root was collected by the writer at Lawnside, New Jersey, in July, 1896. The root was well cleaned, allowed to become air-dry and afterwards reduced to fine powder for proximate analysis. The results may be outlined in the order of their succession as follows:

*Petroleum Ether Extract.*—This amounted to ·34 per cent. of the weight of the root. It consisted of caoutchouc, wax and a resin-like substance. The last had a dark brown color, and was insoluble in hot aqueous solution of potassium hydrate. Alcoholic solution of potassium hydrate dissolved it. From the solution so obtained diluted sulphuric acid precipitated a white substance which was soluble in alcohol, and gave precipitates with alcoholic solutions of ferric chloride and lead acetate.

*Ether Extract.*—Ether dissolved ·89 per cent. of the root. Only a small quantity of the extract was soluble in water. The water solution was neutral in reaction. Treatment with Fehling's solution and acid showed the absence of glucosides. The common alkaloidal reagents failed to indicate the presence of alkaloids. That part of the extract which was insoluble in water was completely soluble in alcohol. The solution was acid in reaction. Water precipitated it, as did also alcoholic solutions of ferric chloride and lead acetate. The solution contained resin and phlobaphene. A portion of the alcoholic solution was evaporated to dryness, and the residue treated with potassium hydrate solution at the water-bath temperature. The

solution was filtered off from the undissolved portion, and when treated with diluted sulphuric acid in excess, it deposited a flocculent precipitate of resinous matter which showed no color reactions with strong mineral acids. The filtrate from the flocculent precipitate was shaken with chloroform in a separating funnel. The chloroformic layer was separated and evaporated. The following tests were applied to the residue:

Strong sulphuric acid—one drop produced a red color, which became more pronounced on warming. Strong nitric acid—a few drops produced a red color which intensified on warming.

Strong hydrochloric acid, even when warmed, produced no change.

These reactions correspond, except in the case of hydrochloric acid, with those obtained by previous investigators of the leaves of this plant, and ascribed by them to andromedotoxin.

*Absolute Alcohol Extract.*—The extract amounted to 3·68 per cent. It was of a dark brown color and had a porous character. Water dissolved an amount equal to 1·48 per cent. of the root. The residue consisted of phlobaphene. The water solution was acid in reaction. It contained a small amount of tannin, which reacted as follows:

Lead acetate, flesh-colored precipitate. Ferric chloride, brownish precipitate. Ammonia ferric sulphate, brownish-green precipitate. Gelatin, flesh-colored precipitate. Bromine water, yellow precipitate. Calcium hydrate, reddish precipitate.

These reactions were confirmed by tests applied to a cold-water infusion of the original root. They indicate a tannin similar to that of the oak barks and to the one found in the leaves of Kalmia latifolia, as described by DeGraffe in this JOURNAL for June, 1896. The alcoholic solution of the phlobaphene gave the same reaction with ferric chloride as the tannin. Traces of glucose and saccharose were present. Alkaloids, glucosides and neutral principles were not found after a complete system of application of immiscible solvents to both acid and alkaline water solutions of the extract.

*Water Extract.*—Cold water extracted 3·2 per cent. of organic matter from the root. This comprised ·92 per cent. of mucilage and albuminous matter, a trace of glucose and nearly 1 per cent. of saccharose.

*Alkaline Water Extract.*—Water made alkaline with sodium hydrate dissolved 5·44 per cent. of organic solids. The extract showed 98 per cent. of mucilage and albuminous matter.

*Acidulated Water Extract.*—The root yielded 1·17 per cent. of organic solids to water acidulated with hydrochloric acid. Pararabin was present. The next treatment was with boiling acidulated water, but the extract was not worked.

*Starch.*—This constituent was determined on a separate portion of the original root. Two determinations were made; one showed 11 38 per cent., the other 11·43 per cent.—an average of 11·40 per cent.

Treatment of the residue from the boiling with acidulated water with chlorine water, produced a loss which indicated 20·18 per cent. of lignin.

The residue from this treatment was ignited. The loss indicated 47·40 per cent. of cellulose and allied substances. Moisture was found in the root to the extent of 5·06 per cent. The amount of ash was 1·24 per cent. A qualitative analysis of the ash showed the presence of the following:

Water dissolved 16 16 per cent. of the ash. The solution contained aluminum and potassium combined with hydrochloric and sulphuric acids. Hydrochloric acid dissolved 33·14 per cent. of the ash. The solution contained calcium, magnesium, aluminum, iron and manganese combined with phosphoric acid. The remainder of the ash consisted of adhering soil.

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## NOTES ON OPIUM ASSAYING.[1]

BY FRANK X. MOERK, PH.G.

For several years past the writer has adopted certain procedures in assaying gum opium, the results of which were expected to assist in perfecting this assay process.

The sample of gum opium received for analysis is weighed and dried for about twelve hours at 80-85° C.; drying is facilitated by cutting the sample into pieces about the size of cherries before weighing. The loss in weight is noted, and the partly dried opium is coarsely powdered and thoroughly mixed; of this, 2 grammes are taken for the residual moisture estimation, and 8 grammes for the morphine estimation, according to the U.S.P. The latter quantity, as a rule, corresponds very closely to 10 grammes moist opium; the exact quan-

[1] Read at the meeting of the Pennsylvania Pharmaceutical Association, June 22, 1897.

tities of moist and perfectly dry opium are, however, to be calculated from the loss sustained in drying. This procedure enables a uniform sample from which concordant results can be obtained when assayed at some subsequent time, and calculated to opium containing the original quantity of moisture.

In powdering the partly dried opium in glass or iron mortars, electricity is developed and there is difficulty in avoiding loss from particles being thrown about; this phenomenon was not noticed when using wedgewood mortars.

The crude morphine obtained by the U.S.P. process was first weighed on counterbalanced filters and again after transferring to a watch-glass; it will be noticed that there is, in the majority of cases, a difference due to but a few milligrammes. In transferring, a camel's hair pencil has to be used with some force to remove all of the morphine from the filter, and this generally results in loosening some of the fibres of the paper, which then contaminate the morphine.

The purity of the morphine is an important matter; for its determination, several methods are in use, as the solubility in lime-water, the solubility in alcohol and the ash method. If we look into the question of the impurities which can be present in crude morphine, there may be other opium alkaloids, particularly narcotine, sulphates of calcium and strontium, phosphates of calcium and magnesium, meconates of potassium, calcium and magnesium, and generally a little coloring matter; this does not exhaust the list of substances that are possible, or even of those that have been found, but it is sufficiently comprehensive to allow some reflections upon the probable accuracy of these several methods of correction. The *alcohol method* will give as morphine everything soluble in alcohol, hence, narcotine and coloring matter will be returned as morphine; it reveals the ash-yielding constituents, particularly if absolute alcohol be used; and if, after weighing the insoluble matter, this be ignited and weighed, the factor for calculating ash into impurity can be obtained and compared with the present factor, which is simply theoretical. The objection to the alcohol method has been the expense and the difficulty of filtering out the very fine precipitate.

The *lime-water method* was the one first proposed for ascertaining the purity of the morphine and was particularly recommended as a means of detecting narcotine. After Stillwell proposed the alcohol method Squibb, in a series of experiments, obtained almost identical

results in comparing these two methods. The ash obtained by igniting crude morphine, was considered to be pure calcium oxide or carbonate (depending upon the temperature of ignition), derived from calcium meconate, until the writer in AM. JOUR. PHARM., September, 1894, proved that the ash was a very complex mixture, and this has since been verified by Mr. L F. Kebler. The writer also raised the question as to the effect of lime-water upon this complex mixture of salts, giving rise to the ash ; experiments made since that time enable me to say that the lime-water solution, even after reprecipitation of the morphine, is always more or less colored ; the reprecipitated morphine dissolved in dilute sulphuric acid frequently yields a pink to rose-red colored solution, due to some foreign organic substance which requires several reprecipitations for its elimination ; in dissolving crude morphine in lime-water I have observed that, if perfect solution does not result, a fine white precipitate deposits at first, which, in the course of the half hour allowed for the solvent action of the lime-water, changes to a yellow flocculent precipitate ; 0·050 gramme of a precipitate (obtained from the mother-liquor of an opium assay), allowed to stand for half an hour with 10 c.c. lime-water, then filtered, and washed first with lime-water, then with distilled water, dried at 50-55° C., and weighed, showed an increase in weight of 0·004 ; it had also changed in appearance as just described. These experiments confirm my previous supposition of the chemical change taking place by the lime-water solution, but I had rather expected a decrease in the weight, because of the presence of potassium meconate, and its possible reaction with lime-water to form calcium meconate and soluble potassium hydrate ; but the insoluble part in lime-water gave apparently as good a test for potassium salts with platinic chloride as did the original substance. An interchange between magnesium meconate or phosphate and calcium hydrate, because of the formation of insoluble calcium meconate or phosphate and insoluble magnesium hydrate, will cause an increase in weight and seems probable. From these experiments, we must say that all of the organic matter is not revealed by this test, and that the ash-yielding substances are, at least in part, chemically changed ; so that this correction can also not be considered an accurate one.

The *ash method* will not reveal organic matter, and based upon the assumption that the ash consists entirely of calcium oxide or

carbonate derived from calcium meconate, and to which the ash is calculated by the use of factors (4·55 for calcium oxide and 2·56 for calcium carbonate), despite the fact that considerable potassium carbonate is present (which should require a different factor), and disregarding entirely that the sulphates and phosphates of the metals present sustain comparatively little loss by ignition (the factor for which cannot be foretold), the result being that the correction based entirely upon the weight of the ash will be too high unless counterbalanced by the presence of foreign organic matter, an assumption which cannot be proven at the present time.

A number of comparisons of the lime-water and ash methods have been published and agreed very well. Any difference between the corrections could be allowed for from the above statements. In May, 1896, Mr. L. F. Kebler published in the AMERICAN JOURNAL OF PHARMACY a series of comparisons in which some new possibilities were brought forward. Of the *seventeen* samples reported, *one* yielded no ash and no correction by either method; *one* the same correction by both methods; *seven* a higher correction by the lime-water method with the percentage of ash normal, *i. e.*, below either correction; *five* a higher correction by the ash method, with the percentage of ash normal; and *three* a higher correction by the ash method, with the percentage of ash abnormal, *i. e.*, greater than the lime-water correction. To explain these results it must be admitted that in some cases there is an ash-yielding substance which is soluble in lime-water, whilst in other cases there must be present some organic impurity which is not soluble in lime-water, and of course yields no ash.

While not one of these methods of correction can be considered satisfactory, the writer has given preference to the lime-water method as involving on the one hand less change during the manipulation, and on the other hand because of the easier filtration of the solution, and the possible reprecipitation of the morphine; care must be taken, by keeping the funnel covered with a watch-glass to prevent the formation of calcium carbonate if working near a flame. In the assays to be detailed, the lime-water correction was used; 0·5 gramme of the well-mixed crude morphine was weighed into a flask and thoroughly moistened with 5 c.c. lime-water before adding the remaining 45 c.c.; rotate the contents of flask repeatedly during half an hour, and then filter the solution through counterbalanced

filters (7 centimetres), rinsing the precipitate in the flask upon the filter by the use of small portions of the filtrate; wash the flask and filter with 5 c.c. lime-water, added in portions of 1 c.c. After the last c.c. drains off, set aside the filtrate and washings and wash the filter with 5 c.c. distilled water applied in portions of 1 c.c.; after draining press the filter between bibulous paper and dry at 50–55° C. to constant weight; this weight is then calculated to entire weight of crude morphine, and, subtracted from the weight of the crude morphine as weighed on a watch-glass, gives the weight of the *pure morphine*, which is then calculated to 100 parts of opium.

The lime-water solution of the crude morphine is thoroughly agitated after adding 6 c.c. ether (just enough to saturate the solution, and for the purpose of rendering the precipitation of morphine as complete as possible; morphine, particularly in presence of foreign organic matter, is less soluble in water saturated with ether than in pure water); 0·150 gramme ammonium chloride is next added and agitation continued for ten minutes before setting aside for 10 to 12 hours, or over night (the 55 c.c. lime-water require 0·140 gramme ammonium chloride for neutralization, so that there is but a slight excess added); filter through counterbalanced filters (7 centimetres); rinse the flask several times with a little of the filtrate to remove the remaining morphine crystals, and then wash the morphine and filter with 15 c.c. distilled water, applied in portions of 1 c.c.; dry the filter as above described, at 50–55° C., and weigh. The combined weights of the recovered morphine and of the correction subtracted from 0·500 gives the loss sustained in the purification, and represents chiefly the morphine remaining dissolved in the 55 c.c. of mother-liquor.

In looking over these results it will be seen that the impurity in the crude morphine does not depend so much upon the length of time in which the assay is allowed to stand as upon variations in the samples of opium (the assays standing 15 hours, for instance, illustrate this point); it has previously been proven that in any given sample of opium the impurity increases with the time allowed for precipitation.

Believing that the great difference in the quantity of the impurity was due to variation in the ash-yielding constituents, a number of the samples of opium, kept in the partly dried condition, were examined. Two grammes of the sample were dried at 100° C., then in-

| Number and Nature of Opium. | Date of Analysis. | Percentage of Moisture. | Hours Allowed for Precipitation of Morphine. | Percentage of Crude Morphine Weighed. | | Percentage of Pure Morphine by Lime-Water Test. | Percentage of Crude Morphine Insoluble in Lime-Water. | Percentage of Crude Morphine Recovered from Lime-Water Test. | Percentage of Loss Incurred by Solution in Lime-Water. | Weight of Morphine Left in 55 c.c. Lime-Water Mother-Liquor. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | On Filters. | On Watch-Glass. | | | | | |
| 1. Gum | 10–15–94 | 25·16 | 8 | 11·62 | 11·56 | 11·48 | 0·70 | 86·60 | 12·70 | 0·0635 |
| 2. Powdered | 11– 2–94 | 9·56 | 21 | 12·09 | 12·63 | 12·39 | 1·90 | 89·70 | 8·40 | 0·0420 |
| 3. " | 12–18–94 | 7·62 | 15 | 13·77 | 13·09 | 12·90 | 5·60 | 88·00 | 6·40 | 0·0320 |
| 4. Gum | 1–14–95 | 23·62 | 15 | 12·20 | 12·18 | 11·99 | 1·60 | 91·90 | 7 50 | 0 0375 |
| 5. " | 2–28–95 | 23·39 | 13 | 12·19 | 12·18 | 12·14 | 0·30 | 89·70 | 10·00 | 0·0500 |
| 6. " | 4– 4–95 | 19·60 | 13½ | 12 45 | 12·42 | 12·34 | 0·70 | 90·90 | 8·40 | 0·0420 |
| 7. " | 5– 9–95 | 23·10 | 17½ | 11·36 | 11·33 | 10·91 | 3·70 | 85 70 | 10·60 | 0·0530 |
| 8. " | 6–25–95 | 23·29 | 12 | 11·57 | 11·55 | 11·53 | 0·20 | 90·90 | 8 90 | 0·0445 |
| 9. " | 7–26–95 | 23·70 | 12 | 11·18 | 11·15 | 11·08 | 0·60 | 90·20 | 9·20 | 0·0460 |
| 10. " | 10–24–95 | 25·35 | 14½ | 10·76 | 10·74 | 10·72 | 0·20 | 90·30 | 9·50 | 0·0475 |
| 11. " | 12–17–95 | 22·73 | — | 10·45 | 10·43 | 10·39 | 0·40 | 91·10 | 8·50 | 0·0435 |
| 12. " | 2–19–96 | 26·78 | 16½ | 11·32 | 11·27 | 11·20 | 0 60 | 91·40 | 8·00 | 0·0400 |
| 13. " | 3–23–96 | 22·93 | 13 | 9·69 | 9·66 | 9·62 | 0·40 | 91·90 | 7·70 | 0·0385 |
| 14. " | 5–19–96 | 26·10 | 13½ | 10·04 | 10·02 | 8·60 | 14 20 | 79·20 | 6·60 | 0·0330 |
| 15. " | 7–10–96 | 23·32 | 15 | 12·08 | 11·96 | 10·38 | 13·20 | 78·40 | 8·40 | 0·0420 |
| 16. " | 7–15–96 | 25·04 | 17 | 10·41 | 10·34 | 9·31 | 10 00 | 82·00 | 8·00 | 0·0400 |
| 17. " | 7–29–96 | 23·40 | 16½ | 10·80 | 10·72 | 9·58 | 10·60 | 82·20 | 7·20 | 0·0360 |
| 18. " | 10–13–96 | 22·92 | 13 | 11·42 | 11·38 | 10·15 | 10·80 | — | — | — |
| 19. " | 2– 8–97 | 23·10 | 15 | 11·24 | 11·18 | 10·66 | 4·70 | 86·40 | 8·90 | 0·0445 |

cinerated for total ash ; this, macerated with 10 c.c. water for one-half hour, filtered, and filter and contents washed with water, 1 c c. at a time, until the filtrate measured 20 c.c.; the filter, with insoluble portion of the ash, was dried, ignited and weighed, the difference between that and the total ash giving ash soluble in water. The figures are in terms of percentage and relate to perfectly dried opium ; for convenience of comparison the percentage of impurity in the crude morphine is appended. The figures in the last column are results of another series of experiments, to be mentioned a little later.

| Number. | Moisture. | Total Ash. | Soluble Ash. | Insoluble Ash. | Impurity in Crude Morphine. | Ash of Dregs. |
|---|---|---|---|---|---|---|
| 8 | 5·00 | 6·37 | 3·21 | 3·16 | 0·20 | 2·68 |
| 10 | 5·22 | 5·51 | 2·95 | 2·56 | 0·20 | 2·56 |
| 14 | 4·90 | 6·68 | 3·50 | 3·18 | 14·20 | 2·92 |
| 15 | 5·27 | 5·36 | 3·17 | 2·19 | 13·20 | 1·87 |
| 16 | 5·65 | 7·15 | 3·60 | 3·55 | 10·00 | 2·94 |
| 17 | 5·05 | 5·53 | 3·53 | 2·00 | 10·60 | 1·79 |
| 18 | 4·95 | 7·59 | 3·17 | 4·42 | 10·80 | 3·71 |
| 19 | 3·47 | 5·36 | 3·29 | 2·07 | 4·70 | 1·81 |

There is no clue here for an explanation, as comparison of No. 8 with Nos. 15, 18 and 19 will prove, unless it were by quantitative analysis, which the quantity of ash did not permit. The aqueous solutions, excepting Nos. 8 and 15 and all of the insoluble ashes moistened with water, gave pink or red colorations with phenolpthalein, but a single drop of a very dilute sulphuric acid discharged the color; the insoluble ashes were mixed with water and titrated with dilute sulphuric acid using methyl-orange as indicator, but the results were as conflicting as the above ash determinations.

As a further probable explanation was based upon the acidity of the aqueous opium infusion dissolving some of what in the preceding table is called insoluble ash, and the addition of ammonia afterwards reprecipitating this, a series of experiments were made, in which 2 grammes were extracted with water, as in the official assay, to make 64 c.c. filtrate; the dregs were dried and ignited, and the results, representing percentage of ash left in the dregs of perfectly dried opium, are found in the last column of the preceding table. The determination with No. 8 was made last, and was sufficient to shatter

conclusions based upon the other seven samples; it will be seen that there is a decrease of from 0·21 to 0·71 per cent. between the insoluble ash and the ash of the dregs, in the case of those samples yielding an impure crude morphine, whilst No. 10, yielding a pure morphine, showed no decrease.

While these experiments were going on, I also tried in various ways and with different indicators to determine the acidity of the opium or opium infusion directly, but these efforts were fruitless.

The loss in the reprecipitation of the morphine varies from 0·033 to 0·0635 gramme., and while all of this may not be morphine, owing to the influence of the lime-water upon the impurities in the crude morphine, it opens up the question of the morphine left in the mother-liquor in the assays proper. When it is remembered that this operation was carried out so as to minimize the loss, that the use of alcohol and of larger quantities of ether in the assays will necessarily cause greater loss, and that the morphine actually weighed must be subjected to a correction which itself is arbitrary, one can realize that much work will yet have to be done before a satisfactory or accurate opium assay process is arrived at. Of the two problems to be solved, the one disclosing accurately the quantity of morphine in mother-liquors is considered the more difficult; in fact, the solving of this will practically also solve the purity of any isolated morphine.

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# ANALYTICAL PROCESSES AND LABORATORY NOTES.

By Charles H. LaWall.

## ASSAY PROCESSES FOR KOLA, GUARANA AND COFFEE.

A method for the estimation of caffeine in kola, guarana and coffee, which obviates the use of the Soxhlet extraction apparatus, has been used with success during the past year. The results agree closely with those obtained by the long and tedious processes formerly employed, and can be obtained within a much shorter space of time. It resembles closely the process recently suggested by Dr. Keller for the determination of caffeine in tea. The directions are as follows: Into a separatory funnel of convenient size, place 5 grammes of the drug and 5 c.c. 10 per cent. ammonia water. Allow the mixture to stand for thirty minutes, then shake out the alkaloid with chloroform, using three portions of 20 c.c. each.

If emulsification occurs, add powdered magnesium carbonate in small quantities until separation takes place. Transfer the mixed chloroform washings to a tared flask, recover the solvent in the customary manner, and weigh the residue, which consists of fat and alkaloid together.

Dissolve the fat with warm ether, using successive fractions of 20 c.c., until the ethereal washings leave no perceptible residue upon evaporation of a small quantity. With careful manipulation, the ether can be decanted each time without loss of caffeine; but as a precautionary measure, the ethereal washings may be filtered, the filter washed well, first with ether and then with chloroform, transferring the chloroform washings back to the flask for evaporating and weighing. The residue in the flask is almost pure caffeine, and the difference between the weights of the first residue and the last is the amount of fat present in the drug.

In the case of kola, the ether also removes the theobromine, which is usually but a small percentage and may be ignored.

The following comparative results have been obtained:

KOLA NUTS.

| | |
|---|---|
| No. 1, Exhausted with chloroform in Soxhlet | 1·39 per cent. caffeine. |
| No. 2, Exhausted by the foregoing process | 1·37 " " |
| No. 3, " " " " | 1·48 " " |
| No. 4, " " " " | 1·43 " " |
| No. 5, " " " " | 1·40 " " |

GUARANA.

| | |
|---|---|
| No. 1, Exhausted with chloroform in Soxhlet | 4·32 per cent. |
| No. 2, Exhausted by the foregoing process | 4·68 " |
| No. 3, " " " " | 4·62 " |

In assaying the fluid extracts of the drugs above mentioned, however, the Lloyd ferric hydrate process gives the most satisfactory results.

ESTIMATION OF ALKALOIDS IN WHITE HELLEBORE.

In answer to query No. 48 of the proceedings of this Association for 1896, the following results are submitted. The well-known general assay process of Dr. Keller was used with satisfactory results, the details being as follows: Place in a dry flask—

| | |
|---|---|
| White hellebore | 10 grammes. |
| Chloroform | 25 " |
| Ether | 75 " |
| 10 per cent. ammonia water | 10 " |

Shake vigorously, and allow to stand for six hours or over night, then add 5 c.c. 10 per cent. ammonia water, shake well and pour off 50 grammes of the clear solution (representing 5 grammes of the white hellebore). Transfer the solution to a separatory funnel and shake out the alkaloid with acidulated water, using three fractions of 20 c.c. each. Place the aqueous washings in a separatory funnel, and, after rendering alkaline with ammonia water, shake out the separated alkaloid with a mixture of chloroform 3 volumes, ether 1 volume. Transfer these washings to a tared flask, recover the solvent, if desired, and weigh the residue, which is the total amount of alkaloid in 5 grammes of the drug.

The results shown below were obtained by the foregoing process, using the commercial drug in the form in which it is sold for an insecticide. Five different samples assayed respectively:

No. 1, 1·20 per cent.; No. 2, 1·24 per cent.; No. 3, 1·25 per cent.; No. 4, 1·12 per cent.; No. 5, 1·18 per cent. alkaloids.

A sample of the whole drug was also ground and assayed. This yielded 1·75 per cent.—a somewhat higher yield, which should be verified by assaying numerous different samples before accepting it as a standard. The results as obtained show the commercial drug to be uniform and about 1 per cent. would be a fair limit for the minimum allowable yield of alkaloids by this process.

### ARE C. P. CHEMICALS CHEMICALLY PURE?

In answer to query No. 44, requesting information upon the subject, it is difficult to give a definite reply. The term *Chemically Pure*, commonly abbreviated *C. P.*, is used with such frequency when applied to inorganic compounds, that it loses its force in a great degree. To comply with this description accurately, a chemical should be absolutely free from all foreign compounds, an ideal requirement seldom found in practice. As generally applied, it has come to mean simply a very high degree of purity, such as is required for analytical reagents, and, according to this interpretation of the term, the quality of most C. P. chemicals sold, is in accordance with the description. As an illustration of this accepted meaning, sulphuric acid may be mentioned. This acid is listed as "C. P.," and also "C. P., free from arsenic." The latter commands the higher price, thus indicating a degree of purity higher than "C P."

Some cases have been observed in which the term was clearly

misapplied. Among these were "C. P. chemicals for photographic purposes," as sodium thiosulphate and sulphite containing iron and zinc; also sodium carbonate containing large quantities of chlorides and sulphates. Fortunately, instances of this kind are rare, and, with the exception of one manufacturer who evaded the question by claiming that C. P. meant commercially pure, it has been found that chemicals when designated C. P. conform to these requirements as closely as is practicable. In this connection, the fact that even the U.S.P. is somewhat inconsistent in its requirements for the purity of certain chemicals may be new to some persons. The requirements of the U.S P. for the purity of carbonate and bicarbonate of sodium allow a limit of chlorides and sulphates in each case. In benzoate, salicylate and other salts of sodium, which are made from one of the first-mentioned bases, absolute freedom from chlorides and sulphates is required, with no apparent reason for such an increase in the standard of purity; the result being that the salts of sodium, such as those mentioned, are found, in most cases, to contain traces of chlorides and sulphates, even when labelled U.S.P. The fulfillment of such increased requirements generally means an increase in the cost of the compound, with no practical benefit resulting therefrom.

In criticising the quality of C. P. chemicals, care should be taken not to overstep the bounds of reason, as in a certain case where a bottle of C. P. ferrous sulphate was returned after some weeks as not answering the tests for a pure salt. As the bottle was only partly filled, and loosely stoppered, the complaint was unreasonable. It is easier to find fault with an article than it is to make excuses for any deficiencies discovered; but, for the interests of commercial harmony, let us avoid being hypercritical. For use as reagents, chemicals should be required of the highest standard possible, but for prescription use it is unnecessary to require conformity to a standard of purity which raises the cost of the compound without increasing its practical value.

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A chart of the *Mineral Products of the United, States* from 1887 to 1896 inclusive, has recently been issued by the U. S. Geological Survey. The products are divided into two classes, metallic and non-metallic. The grand total in value of both metallic and non-metallic products amounted in 1887 to $520,-714,474, and gradually rose to $648,670,798 in 1892, when it dropped off some $74,000,000 in 1893, the values thereafter being somewhat variable, and in 1896 they had risen to $611,510,700.

# A CONTRIBUTION TO THE KNOWLEDGE OF SOME NORTH AMERICAN CONIFERÆ.[1]

By Edson S. Bastin and Henry Trimble.

(*Concluded from page 97, of this Volume.*)

## TSUGA MERTENSIANA, CARR.

### DISTRIBUTION AND GENERAL CHARACTERS.

This species is known as Western hemlock or Californian hemlock spruce. It was first named and described by the Russian botanist, Bongard, who gave it the name Pinus Mertensiana, and the locality Sitka, in Alaska. It occurs, however, on the Pacific Coast, from the vicinity of San Francisco through Oregon to Alaska.

While similar in appearance to our Eastern species, it is, when fully developed, a tree of much larger size, sometimes attaining a height of 200 feet. It is also straighter grained, and has a redder and usually thicker bark, but the most distinctive difference, perhaps, is in the fruits and seeds, the scales of the cones being more elongated, and the wings of the seeds being relatively longer and straighter.

### MICROSCOPICAL STRUCTURE.

The barks of the Eastern and Western species are the only ones that have been examined microscopically. They showed, as might have been expected, a great similarity in structure, though there appeared to be some characters which we may rely on for distinguishing them. In both it was seen that cork formation begins early, and, in all cases, where the bark was taken from stems more

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[1] The death of Professor Bastin has necessarily brought the publication of this series of papers to a close. As there was sufficient material left by him to nearly complete the structural description of the Tsuga, it was thought the publication of this paper, by completing the genus, would make a more acceptable ending. Professor Bastin was working on the structure of Tsuga Caroliniana until shortly before his death, but it is to be regretted that the drawings were not completed. As all the originals of the illustrations in this series of papers were from his pen, no attempt has been made to have the few remaining ones of this genus completed by others.

A number of reprints have been prepared, and copies will be mailed to any one applying for them, until the supply is exhausted.

It is the hope and expectation of the surviving author to continue the chemical work on this natural order, as a large number of samples have been collected, much work has been completed, and the results will be published as rapidly as possible.

than two years old, the secondary cork formations had invaded the inner layer of the bark and bands of cork were observed crossing at various angles the medullary rays. The cork in both was colored

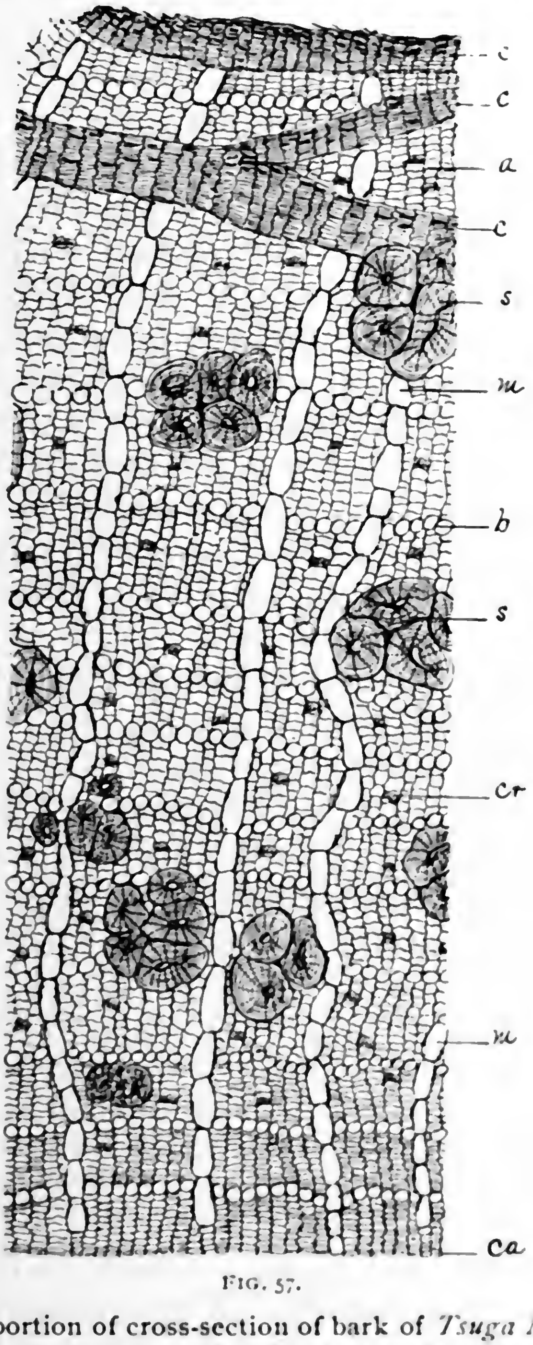


FIG. 57.

*Fig. 57.*—Small portion of cross-section of bark of *Tsuga Mertensiana*, magnified about 50 diameters. *c*, *c*, *c*, bands of secondary cork; *a*, intervening dead tissues, composed of sieve and parenchymatous elements, and, like the other species, rich in tannic, resinous and coloring matters; *s*, *s*, groups of stone cells; *m*, *m*, relatively large, fusiform medullary-ray cells; *b*, band of large parenchymatous cells; *cr*, crystal cell; *ca*, cambium cells.

a deep purple, and this coloring matter was bleached out with difficulty, even by Labarraque's solution. This coloring matter appeared to be different in character from the reddish-brown coloring substance found in the tissues between the bands of cork, for not only was the latter a different shade of red, but it bleached more readily.

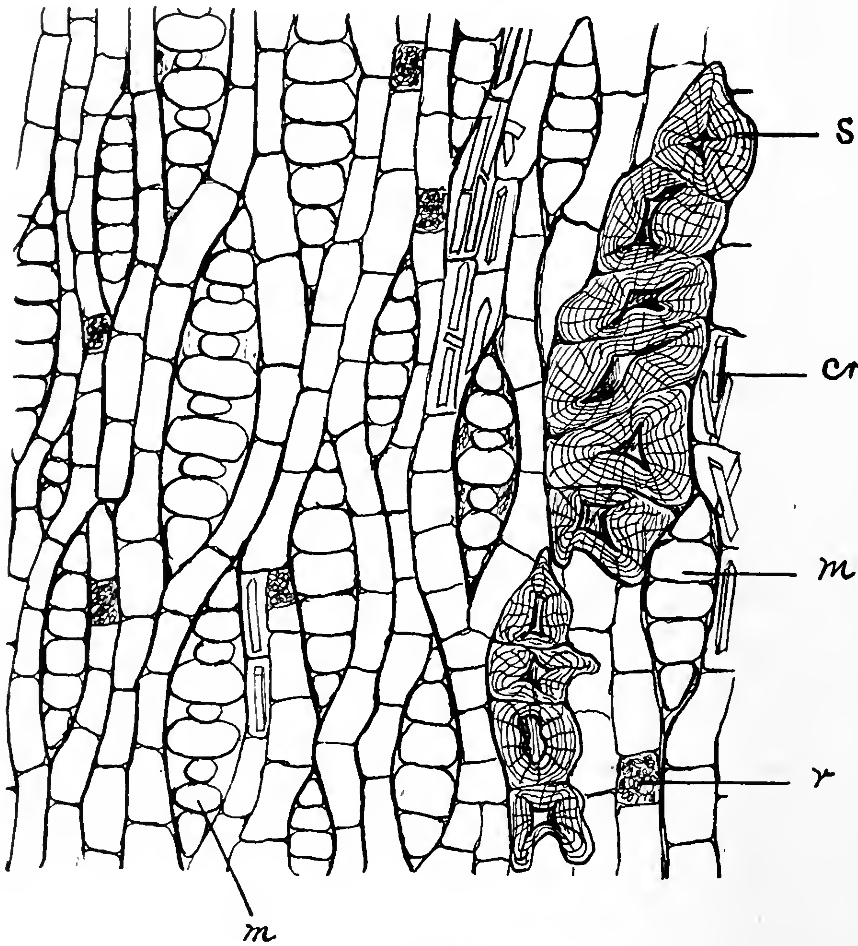


FIG. 58.

*Fig. 58.*—Small portion of longitudinal-tangential section of bark of *Tsuga Mertensiana*, magnified about 75 diameters. *s*, cluster of stone cells; *cr*, crystals of calcium oxalate; *m*, *m*, medullary rays; *r*, oleo-resin cell.

Tests for tannin showed in Tsuga Mertensiana that the white or colorless younger portions of the bark contained but little of it, while the older portions, particularly the dead sieve and parenchyma tissues between the bands of secondary cork, were observed to be particularly rich in it.

Stone cells of large size, and often quite irregular, occurred, either

isolated or clustered in groups of several or many, throughout all except the youngest portions of the inner bark. They were quite numerous, but distributed without apparent order. They were marked with numerous very fine pore-canals, and very numerous and fine concentric lines. Although abundance of starch was found in the bark of Tsuga Canadensis, none was observed in the bark of T. Mertensiana. It is possible, indeed probable, that a sample of the latter collected at some other season of the year would show the presence of starch. The medullary rays in both barks were observed to be composed of single rows of cells, and these were radially elongated and of large size as compared with those of adjacent tissues; but those of T. Mertensiana were, on the average, larger, and the rays in this species, as seen in a longitudinal-tangential section were composed, on the average, of a larger number of cells.

These differences in the medullary rays are, perhaps, the most constant ones between the two barks. In both barks an abundance of calcium oxalate crystals was observed. (See *Fig. 55.*) They were mostly in the form of long prisms, and were contained in rows of elongated cells of narrow diameter, which traversed the bark in the direction of its length. The crystals were frequently associated in the containing cells with resinous and coloring matters. In form and arrangement they did not differ in the two barks, but appeared to be rather more abundant in the Pacific Coast species.

Oleoresin cells appeared to be about equally abundant in the two species. Those that did not also contain crystals were isolated or in rows of two or three, and the cells were shorter and broader than the crystal cells, though they were not usually so large as the parenchyma cells, with which they were associated. They were scattered through the inner bark without apparent order. Besides the oleoresin cells proper, just described oleoresin, was seen to occur in many cells not especially devoted to secretions; this was particularly true of the cells in the older portions of the bark.

## CHEMICAL COMPOSITION.

The constituents of Tsuga Mertensiana do not appear to have been investigated. The work for this paper was mostly confined to an estimation and examination of the tannin in the stem bark. The sample used in the investigation was collected by Professor F. E.

Lloyd, of Forest Grove, Oregon. The following results were obtained:

| | Per Cent. |
|---|---|
| Moisture | 5·76 |
| Ash in absolutely dry substance | 1·42 |
| Tannin in absolutely dry material | 11·37 |

A quantity of the tannin was prepared, purified and submitted, after drying at 120° C., to elementary analysis, whereby the following percentages were obtained:

| | Per Cent. |
|---|---|
| Carbon | 59·11 |
| Hydrogen | 4·93 |
| Oxygen | 35·96 |
| | $100·00 |

These results and the qualitative reactions indicate that the tannin of Tsuga Mertensiana is identical with that from T. Canadensis, and, therefore, with that from the bark of a large number of species of oak.

### ECONOMICS.

The wood of Tsuga Mertensiana is pale, tough and soft, and is often used for building purposes. The bark of the roots yields a strong fibre that is said to be employed for seines and nets, probably by the Indians. Authorities differ somewhat in regard to the resin, Kellogg stating that it yields a considerable quantity, while others report the resin as scarce. The bark of the trunk, with its rich percentage of tannin, has always been in demand for making leather.

## TSUGA CAROLINIANA, ENGELM.

### DISTRIBUTION AND GENERAL CHARACTERS.

The Carolina hemlock is found along the Allegheny mountains from southwestern Virginia to South Carolina. It has been found at an elevation of 4,200 feet. It does not occur very abundantly, and, because it is said to be a rather handsomer tree than T. Canadensis, it is cultivated somewhat at the North.

Carolina hemlock is not a very large tree; its height is given by different authorities as 40 to 80 feet. The wood is brownish in color, soft and brittle. The cones and leaves resemble those of the common hemlock, but both are a trifle larger.

### CHEMICAL COMPOSITION.

The specimen used in this investigation was obtained from the Highlands Nursery, near Kawana, North Carolina. No published record can be found of an examination into the composition of any part of this tree. The leaves, the stem bark and the root bark were partly examined with the following results:

| | Moisture. | Ash in absolutely dry material. | Tannin in absolutely dry material. |
|---|---|---|---|
| Leaves | 7·07 | 2·70 | 4·52 |
| Stem bark | 8·22 | 1·44 | 18·35 |
| Root bark | 5·95 | 2·20 | 17·02 |

The ashes of these several parts contained potassium and calcium as phosphates and carbonates, and silica; besides these, the ashes of both barks contained sulphates. No further investigation was made of the tannin, but it is safe to predict its identity with that from the other species.

### ECONOMICS.

On account of the scarcity of this tree, it does not appear to have been put to any practical use, although a comparison indicates that it could be applied to all the uses now possessed by the common hemlock.

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## INSECT POWDERS OF COMMERCE.[1]

By George Reynolds Durrant.

During the past quarter of a century at least twenty eminent chemists, pharmacists, and microscopists have devoted some attention to the physical characteristics, chemical constituents, and toxic properties of the insect powders of commerce. In the earlier part of this period the references were exclusively to the powder from the flowers of Crysanthemum caucasicum, or Persian variety, which gradually gave way to the Dalmatian kind produced from the flowers of the Crysanthemum cinerariæfolium, and it is possible that the Dalmatian replaced the Persian variety because the latter was the first kind to be grossly adulterated; at least it is true in my experience that both kinds are equally useful if equally free from sophistication.

A careful study of the whole of the subject is more likely, in the absence of much personal experiment and thought, to confuse the

[1] *Pharmaceutical Journal*, June 12, 1897.

reader than to provide him with such information as will enable him to distinguish the true powder from sophistications, which are still as common, although changed in character, as they have been at any time since the Persian powder gave way to its honester rival. To any one who has worked on this subject for a few years, the last paragraph may appear to be superfluous, but it is evident that there is still a plentiful lack of knowledge on the part of the majority of buyers, or it would be impossible to account on any other hypothesis for the enormous amount of grossly sophisticated insect powder which is sold as genuine every season.[1]

The object I have had in view in recording the results of several years' attention to this subject, is to provide a ready means of quickly and cheaply ascertaining if a given sample of insect powder is what it is represented to be by the seller, but before proceeding to this part of the subject, it will be profitable to briefly set forth the results of the work of other investigators. These references will not be by any means exhaustive of the subject, but will include most of the literary notices which have come within my own knowledge.

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[1] While engaged in preparing this paper for the press, a curious confirmation of my contention has been supplied by a correspondence with a provincial firm of dealers in insect powder. I have no reason to doubt the *bona fides* of the firm, and must therefore conclude that such large sellers of insect powder as they claim to be are yet profoundly ignorant of the characteristics of true insect powder. I fear my charity is not sufficiently broad to give credit for good faith in this firm's opinion on the London trade in insect powder! The following short extracts are reproduced from this correspondence: In reply to my request for samples and quotations, "Thank you for your enquiry, and are sending samples of insect powder from closed flowers, 100 *s.* per cwt., and from half open flowers at 75 *s.* per cwt."

My reply to this quotation expressed regret at the misleading description, as both samples were grossly adulterated, which drew a most indignant letter. "In reply to your letter, we think the party conducting the analysis must have made some miscalculation, as we are direct importers from Austria, and have, from the grinders there, the fullest assurance of its genuineness, and that the 'closed' and 'half-closed' are from flowers of that description and from flowers only. We have sold the same article for seven years, and our sale has greatly increased. As regards the London price for insect powder, the import offered in London is second rate, both in quality and quantity, and consists only of odd lots that have passed through several dealers' hands. We write strongly on this subject because we should not have been able to advance our trade in this article to its present state if we had been capable of misdescription!"

It will be found that the literature of the subject divides itself into the following sections:

(*a*) Toxic constituents.

(*b*) Microscopic appearance.

(*c*) Adulterations.

It is intended to keep this division of the subject so far as may be possible and convenient.

So far back as 1863, Hanaman Roch (National Dispensatory) attributed the insecticidal value of the powdered flowers of Crys. caucasicum to a volatile oil. Some years after, in the seventies, Semenoff appeared to be practically in agreement with this statement, but treated the matter more broadly, if less definitely, by substituting "volatile substance" for the more definite, if less accurate, "volatile oil." Immediately after in (1876), Jousset de Bellesme stated that, in his opinion, the active toxic principle was a crystalline alkaloid. In 1877 this last statement was corrected by R. Rother (*Druggists' Circular and Chem. Gazette*), in a paper giving the results of a very systematic and practical investigation; the conclusions at which this writer arrived are as follows: There is no crystalline alkaloid; there are (*a*) an oleoresinous greenish-yellow acid, "persicein;" (*b*) another acid body, "persiretin," both inactive; (*c*) active principle, a glucoside converted by boiling into "persiretin" and glucose. These constituents are all soluble in ether alcohol, benzine and petroleum ether, and insoluble in chloroform. With the latter part of the statement, referring to the solubility of all the constituents of any value in ether, etc., I can cordially agree. Very shortly after the appearance of this article by Rother, a notice appeared in the *Bulletin Soc. Chim.* by G. Dal Sie, in which he claims that the active toxic principle is to be found in a volatile acid existing in the flowers in a free state. M. Finzelberg (*Pharm. Centralhalle*, 1880) proved that a concentrated tincture of the flowers had definite insecticidal properties, and this statement has been confirmed by my own experiments on flies. O. Tester (*Pharm. Journ.* [3]. XII, 359), states that the active principle is a soft resin. At the British Pharmaceutical Conference, 1888, a paper was read by William Kirkby on the microscopical characteristics of the flowers of C. caucasicum and C. cinerariæfolium. The paper was valuable so far as the subject was treated, but it was less complete than the author intended, inasmuch as sophistications were not

taken into consideration. Although the paper itself was thus limited in scope, the discussion which followed covered the whole ground. Mr. Robinson expressed his incredulity at the presence of any toxic agent, but this bold skeptic was crushed by the President, assisted by Mr. Howie and Mr. Martindale.

In the *Pharm. Zeitschr. für Russland*, 1890, E. Hirschsohn states that the active principle is neither a volatile oil nor an acid resin; this statement is neutralized by F. Schlagdenhauffen in an article in the *Pharm. Zeitung*, 1892, in which he states that he found the toxic properties to be (*a*) yellow volatile oil, and (*b*) uncrystallizable soft resinous mass, pyrethrotoxic acid very soluble in ether. It seems to me that the average buyer of insect powder, after careful consideration of the foregoing evidence by so many able men, would remain more or less doubtful as to the properties and characteristics for which he ought to look in deciding upon the value of the various qualities to be found in the insect powders of commerce. The results of my own work on this part of the subject may be briefly stated as follows:

The toxic properties are due to—

(*a*) A volatile oil amounting to 0·5 per cent. in picked specimens of closed flowers, and much less in open flowers.

(*b*) A soft acid resinous body, this is the principal source of the toxic effect. It is found to the amount of 4·8 per cent. in selected closed flowers, less than 4 per cent. in half open flowers, and still less in flowers that are fully open; the whole plant, apart from the flowers, contains mere traces of resin.

The fine dry powder, after exhaustion with ether, has no decided toxic properties, but numerous experiments on beetles convince me that this exceedingly fine powder contributes something to the insecticidal properties by its physical action, perhaps by its effect on respiration, reducing the vitality of the insect, and also by impeding locomotion, and preventing a speedy retreat from noxious surroundings, and a safe return to the customary lodgings. The toxic properties of the volatile oil and resin may be proved by isolating them and mixing them with an inert powder, whose physically deterrent equation has been ascertained by experiment on beetles. I believe no vivisection license is required for this.

Having referred to the toxic constituents of, and the proportions in which they exist in, genuine powder of the flowers of C. cinerariæ-

folium, it is very important to mention the fact that chlorophyll, in its green unchanged form, is not found in selected dried, closed insect flowers, as this fact has an important bearing on one (and I think the most prevalent) form of sophistication to be found in the present insect powders of commerce. I cannot fully explain why it is that insect powder from half-open, and from flowers that are fully developed, should show a certain amount of chlorophyll coloring in the ether extract, but it may possibly be that less care is taken in collection of these than is the case with the more valuable closed flowers. But whatever may be the cause, the fact remains that insect powder ground from selected closed flowers is sensibly free from chlorophyll, whereas traces of it (less than 0·5 per cent.) will be found in powders prepared from mixed and half-open flowers, and in the foreign-ground insect powders it often amounts to from 50 to 80 per cent. of the total ether extract. Samples have been recently examined by me yielding 6 per cent. of ether extract, of which more than two-thirds was owing to chlorophyll. It will therefore be seen that any estimate of the value of insect powder based upon the percentage of ether extract would be quite fallacious unless the chlorophyll be also determined and deducted from the total. Microscopical examination is useful in distinguishing the grosser forms of admixture, such as powdered quassia and the woody tissue of the leaves and stems of the plant, but this latter form of sophistication can be determined by the method given further on. [For full particulars of the microscopical appearance of true insect flowers, the reader is referred to the paper by Mr. William Kirkby, F.R.M.S. (*Proc. Brit. Pharm. Conf.*, 1888).]

*Adulterants.*—In using the term adulterants as applied to our subject, it is intended to imply the presence in insect powder of anything but the flowers of C. cinerariæfolium. Adulterators of insect powder have for their first object the cheapening of the article sold, and occasionally they have a second object, *i. e.*, to improve its color.

The first object has been achieved in the past by the addition of powder of quassia, aloes, senna and Hungarian daisy, and the artistic eye of the ignorant buyer has been satisfied by the addition of the powder of fustic, turmeric and chrome-yellow. The presence of quassia, fustic and turmeric may be detected by the aid of the microscope, and chrome-yellow (salt of lead) chemically. The presence of the powder of Hungarian daisy is more difficult to detect

microscopically, but it yields 10 per cent. of ash, whereas true insect powder yields but 6·5 per cent. On this point the reader is referred to an extract from a paper by J. Schrenk (AMERICAN JOURNAL OF PHARMACY, 1889) in the "Year Book," 1890.

It is hoped that it will not be difficult to accept my contention that by the term insect powder it is intended by both buyers and sellers that powder of the flowers of the C. cinerariæfolium is understood, at least so far as transactions in the open market are concerned. Owners of proprietary insect powders have a right to compound them as they please, and this right has been freely exercised by the use of powdered quassia, colocynth, etc., as well as by the addition of various coloring agents. Although powdered quassia mixed with powdered insect flowers must be considered to fall under our definition of adulteration, it is quite possible that a small proportion is useful in insect powder, increasing or broadening the base of its usefulness. The same remarks apply to other admixtures, such as powdered bitter apple, and the only criticism to be made on this point is that if powdered quassia or other powders having insecticidal properties be added to insect powder, let it be done with the knowledge of buyers and at the proper price.

The adulterants just referred to are for the most part things of the past, with the exception of added coloring matters, which are still very commonly used to meet the too general want of knowledge of the proper appearance of true insect powder. At the present time the insect powders of commerce may be divided into the following classes:

(1) Ground from closed (*a*) wild, or (*b*) cultivated flowers of C. cinerariæfolium.

(2) Ground from half-open or mixed half-open and open flowers.

(3) Ground from damaged flowers.

(4) Foreign-ground, divided into grades of badness under the meaningless terms: "closed flowers," "half-open flowers," etc., etc. Of these sorts there appears to be as many as there are of hens' eggs, which embrace all the kinds between "new-laid" at the top of the list, and "political" at the bottom. The English-ground insect powders do not always justify the description given, but in my experience, the foreign-ground specimens never do, and it is with much satisfaction that it is noted that a ready method of distinguishing "foreign-ground" is to hand.

It will be seen from the remarks made on the toxic constituents of the flowers of C. cinerariæfolium that the following statement embraces the results of my own experience as well as that of the majority of laborers in the same field:

That the value of insect powder is in direct proportion to the combined amount of essential oil and soft acid resin, and in inverse proportion to the amount of chlorophyll, both statements to be read together.

It has not been my good fortune, up to the time of writing this, to have met with one sample of "foreign-ground" insect powder that was not grossly sophisticated.

A perfect sample of insect powder should pass a sieve having at least eighty meshes to the linear inch; the particles would be, therefore, approximately $\frac{1}{160}$ of an inch in greatest magnitude. (The powder has been passed through a sieve with 100 meshes to a linear inch, but 90 is the more usual number.) The powder should yield 5·25 per cent. of combined essential oil and soft resin; chlorophyll should be absent, or present in the merest trace.

The following simple method of testing the value of insect powder should be adopted by all chemists who wish to sell a genuine powder, or, to put the matter on lower grounds, who wish to increase their sale of this really important commercial product. Place 100 grains of the powder to be tested in the cylinder of a glass syringe (1 oz.). The powder should be pressed down compactly on to a piece of absorbent cotton, to act as a filter. Moisten with ether 7·35. Close the top of the syringe, and macerate for thirty minutes; percolation may then proceed; the powder being repercolated with the same fluid four times, and finally washed through with sufficient ether to make up one fluid ounce. The resulting percolate should be of a rich yellow color; if a pronounced green color be the result, the sample may be discarded at once.

In the absence of much green coloring matter, the fluid may be carefully evaporated (temperature not exceeding 200° F.), and the residue weighed in a tared watch-glass. The resulting soft mass should not weigh less than 3·75 grains, and in the finest samples reaches 5·5 grains, and should have the pleasant and characteristic odor of the flowers.[3] At the present time the price of insect powder

[3] Exactness may require the determination of the chlorophyll. If an appreciable amount be present, this may be done by boiling the residue in dilute sul-

varies between 8*d*., and 2*s*. 2*d*. per lb., the highest price representing the value of English-ground powder from closed flowers and the lowest powder "foreign-ground" from the whole plant. This ground whole plant appears to be the principal sophistication, apart from the coloring matter, found in commerce at the present time.

I desire to acknowledge my indebtedness to Mr. Charles Umney for very fine specimens of the dry flowers of C. cinerariæfolium.

## THE LIQUEFACTION OF FLUORINE.[1]

By H. Moissan and J. Dewar.

The physical properties of a large number of mineral and organic compounds of fluorine indicated, theoretically, that the liquefaction of fluorine could only be accomplished at a very low temperature. Whilst the chlorides of boron and silicon are liquid at ordinary temperatures, the fluorides are gaseous, and very far from their points of liquefaction. This is also true with the organic compounds; chloride of ethyl boils at + 12° C., and the fluoride of ethyl at 32°.[2] Chloride of propyl boils at + 45°, and the fluoride of propyl at — 2°.[3]

Similar observations have been made by Paterno and Oliveri,[4] and by Vallach and Heusler.[5]

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phuric acid and volumetrically determining the converted chlorophyll as glucose with a suitable copper solution. For my own purposes I should unhesitatingly reject the sample rather than take this unnecessary trouble, unless a fee were attached to the operation.

[1] M. Moissan brought all his apparatus for the production of fluorine to the Royal Institution on the occasion of his lecture there on Friday, the 28th of May. The next day the writer had the good fortune to witness in the laboratories of the Institution, by M. Moissan and Professor Dewar, some of the experiments which resulted in the liquefaction of fluorine. These experiments mainly owed their success to the unrivalled appliances for the production of intense cold possessed by the Institution, and the skill and experience of Professor Dewar and his assistants in preparing a special apparatus suitable for the examination of, and experimenting with, fluid fluorine, and in the manipulation of large quantities of liquid air.—W. C.

[2] H. Maissan, "Propriétés et Préparation du Fluorure d'ethyle," *Ann. de Chim. et de Phys.*, Series 6, Vol. XIX, p. 266.

[3] Meslans, *Comptes Rendus*, Vol. CVIII, p. 352.

[4] Paterno and Oliveri, "Sur les trois Acides Fluobenzoiques Isomères, et sur les Acides Fluotoluidique et Fluoanisque," *Gazetta Chimica Italiana*, Vol. XII, p. 85, and Vol. XIII, p. 583.

[5] Vallach and Heusler, *Annales de Liebig*, Vol. CCXLIII, p. 219.

Gladstone's experiments on atomic refraction[6] can well be compared with these facts.

In fact fluorine by certain of its properties resembles oxygen, though at the same time it is distinctly at the head of the chlorine group.

The conclusion to be drawn from these observations appears to be that fluorine can only be liquefied with great difficulty. One of us showed that at a temperature of — 95°, at the ordinary pressure, there is no change at all.[7]

In the new experiments which we now publish, fluorine was prepared by the electrolysis of fluoride of potassium in solution in anhydrous hydrofluoric acid. The fluorine gas was freed from vapors of hydrofluoric acid, by being passed through a serpentine of platinum, cooled by a mixture of solid carbonic acid and alcohol. Two platinum tubes filled with perfectly dry fluoride of sodium completed the purification.

The apparatus used for liquefying this gas consisted of a small cylinder of thin glass, to the upper part of which was fused a platinum tube. This latter contained in its axis another smaller tube, likewise of platinum. The gas to be liquefied enters by the annular space, passes through the glass envelope, and escapes through the smaller inner tube. This apparatus was fused to the tube by which the fluorine was supplied.

In these experiments we used liquid oxygen as the refrigerant. It was prepared according to the method already described by one of us, and this research, we may remark, required several litres.[8]

The apparatus being cooled down to the temperature of quietly boiling liquid oxygen (183°), the current of fluorine gas passed through the glass envelope without becoming liquid. But at this low temperature it has lost its chemical activity, and no longer attacks the glass.

If we now make a vacuum over the oxygen, we see, as soon as rapid ebullition takes place, a liquid collecting in the glass envelope,

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[6] J. H. Gladstone and G. Gladstone, "Refraction and Dispersion of Fluobenzine and Allied Compounds," *Phil. Mag.*, Series 5, Vol. XXXI, p. 1.

[7] H. Moissan, "Nouvelles Recherches sur le Fluor," *Ann. de Chim. et de Phys.*, Series 6, Vol. XXIV, p. 224.

[8] J. Dewar, "New Researches on Liquid Air," Royal Institution of Great Britain, 1896, and *Proc. Roy. Inst.*, 1893.

while gas no longer escapes from the apparatus. At this moment we stop with the finger the tube by which the gas had been escaping, so as to prevent air from entering, and the glass bulb soon becomes full of a clear yellow liquid, possessed of great mobility; the color of this liquid is the same as that of fluorine gas when examined in a stratum one metre thick. According to this experiment, fluorine becomes liquid at—185°.

As soon as this little apparatus is removed from the liquid oxygen the temperature rises, and the yellow liquid begins to boil with an abundant disengagement of gas, having all the energetic reactions of fluorine.

We took advantage of these experiments to study some of the reactions of fluorine on bodies kept at extremely low temperatures.

Silicon, boron, carbon, sulphur, phosphorus, and reduced iron cooled in liquid oxygen and then placed in an atmosphere of fluorine, did not become incandescent. At this low temperature fluorine did not displace iodine from iodides. However, its chemical energy is still sufficiently great to decompose benzine and essence of turpentine with incandescence as soon as their temperatures rose to —180°. It would thus seem that the powerful affinity of fluorine for hydrogen is the last to disappear.

There is still another experiment we ought to mention. When we pass a current of fluorine gas through liquid oxygen, a flocculent precipitate of a white color, which quickly settles to the bottom, is rapidly formed. If we shake up this mixture and throw it on a filter, we separate the precipitate, which possesses the curious property of deflagrating with violence as soon as the temperature rises.

We intend to follow up the study of this body, as well as that of the liquefaction and solidification of fluorine, which demand further experiments.—*Comptes Rendus*, Vol. CXXIV, No. 22, p. 1202, through *Chemical News*, June 11, 1897.

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## RECENT LITERATURE RELATING TO PHARMACY.

### A REACTION FOR DISTINGUISHING $\alpha$-NAPHTOL FROM $\beta$-NAPHTOL.

E. Leger (*Jour. de Pharm. et de Chim.*, [6], **5**, 527), distinguishes $\alpha$-naphtol and $\beta$-naphtol by adding to saturated aqueous solutions of each a solution of sodium hypobromite. The solutions of naphtol are prepared by rubbing the respective compounds in a mortar with

water, since by simply shaking in a test tube the naphtol frequently does not become moistened. The solution of sodium hypobromite is made by adding 30 c.c. of soda solution, 36° B. to 100 c.c. of water, and adding 5 c.c. of bromine.

To make the test, one takes of either naphtol solution 10 c.c., to which are added two drops of the sodium hypobromite solution.

(1) With the $\alpha$-naphtol the reagent produces a violet color and precipitate. This reaction is so delicate that if the solution of $\alpha$-naphtol is diluted with nine volumes of water the color is readily distinguished.

(2) The solution of $\beta$-naphtol is turned yellow by the reagent, then greenish and finally back to yellow.

It will be seen that this test is only applicable in a mixture of the two to a detection of $\alpha$-naphtol. That fact, however, does not lessen its value materially in this country, where it is chiefly desired to prove the freedom of $\beta$-naphtol from the $\alpha$-variety.

### ASH OF PINEAPPLE.

J. J. Bowrey (*Bulletin of the Botanical Department, Jamaica*, **3**, 236), gives the following composition of the ash of the pineapple, and draws conclusions concerning its cultivation:

| | Per Cent. |
|---|---|
| Potash, $K_2O$ | 49·42 |
| Potassium chloride, KCl | 0·88 |
| Sodium chloride, NaCl | 17·01 |
| Magnesia, MgO | 8·80 |
| Lime, CaO | 12·15 |
| Phosphoric acid, $P_2O_5$ | 4·08 |
| Sulphuric acid, $H_2SO_4$ | trace |
| Silica, $SiO_2$ | 4·02 |
| Ferric phosphate | 2·93 |
| | 99·29 |

Judging from this analysis, potash is the most important mineral substance which the pineapple requires. Of course, phosphoric acid is also necessary, and so are lime, magnesia and iron; but it must be a very rare soil which does not contain iron and magnesia in ample quantity, and usually there is enough lime also present. It is difficult to make suggestions respecting manuring in total ignorance of the nature of the soil to be manured. But certainly no harm can be done and probably much good by adding phosphoric

acid and potash to the soil, the former is best applied as "basic slag" or "Thomas slag;" 5 to 10 cwt. per acre will supply phosphoric acid for three to four years. The potash can be obtained as chloride for about £8 per ton. From 50 to 100 pounds per acre would be a dressing for a year. The pineapple also needs nitrogen for its growth, this might be supplied as nitrate of soda, at £10 per ton, giving 100 pounds per acre when the plants have started to grow rapidly.

### COLLECTING JUICE OF PAPAW.

F. B. Kilmer, in *Bulletin of the Botanical Department, Jamaica*, **4**, 68, describes the method to be followed in collecting the juice from the fruit of Carica papaya in the Island of Jamaica. Cut an incision lengthwise of the fruit, not over ⅛ of an inch in depth; if it is made much deeper the milk is apt to be carried into the fruit and not run outside. The milk will run quite freely for a short time, but soon coagulates so that it will no longer run. To catch the milk that drops and flows I place under the tree tin pans made in such a way as surround the trunk of the tree and catch the dripping milk.

I found it well to tap the fruit early in the morning, before the sun was very high, as it quickly dried the milk and stopped the flow. After the flow had ceased it was found to be a good practice to brush off all the coagulated milk into the pans and make a fresh incision, when another, but smaller, yield was obtained. The scorings should be made about ½ inch apart all around the fruit. The time to tap the fruit is before it is ripe, and when it is green and full. The yield is much larger just after a rain storm or a spell of wet weather. Still, you can tap a green fruit at any time and obtain more or less of the white milk. This milk must be dried the same day that it comes from the tree, and *must* be dried in the sun. Artificial heat will not do. It can be dried right away on the tin pans, spread out thin, or spread out on sheets of glass. It will dry in an hour or so in the sun. Any amount of exposure to the sun will not harm it in drying, but artificial heat destroys it. If it should so happen in gathering that, owing to stormy weather, it cannot be dried in the sun the day it is gathered, you can mix it with some naphtha or benzine, turning it into a sort of milk.

CUTCH EXTRACTION.

When commercial cutch enters the domain of pharmacy it becomes catechu; but whether cutch or catechu, it is a substance of rather uncertain origin and of very variable composition. The following, from the *Indian Pharmacologist*, **2**, 7, January 1, 1897, indicates that there is still much to be learned about this substance. "One of the most recent issues of the *Agricultural Ledger* series contains a brief account of the examination of a sample of Burma cutch received by a Glasgow firm through Dr. Watt. It is interesting if only for the fact that it brings out strongly the divergence that sometimes exists between chemical analysis and commercial opinion. Dr. Watt suggested that cutch should be manufactured in India by the superior European method of extracting dyes from timber. Twenty tons of the Acacia Catechu timber were procured here and shipped to Glasgow. Dr. Watt saw the timber before it was shipped and considered it to be of average quality. The timber was treated by the vacuum process, and the resulting product was described by Dr. Watt as a cutch of great purity and very good appearance. A chemical analysis by Dr. Leather showed that the cutch thus produced contained 6·58 per cent. of crude catechin and 78·20 per cent. of catechu tannin. At the same time a sample was submitted to the Calcutta Chamber of Commerce for professional opinion, and this was completely opposed to the conclusion of the chemist. Commercial opinion described it as 'very inferior to that imported from Rangoon.' The sample was described as overboiled, and would fetch only Rs. 3 a maund as against Rs. 8 for the best brands of Burma cutch. Clearly the commercial expert who reported on the sample made a mistake in his identification of it, for he reported that it was shipped to the Calcutta market in 2-ounce tins for mixing with paints, 'and in this form it has a special value, but for medicinal purposes, or for bazaar use, that is, for mixing with *pan*, it has no sale.'

"Dr. Watt, in a brief note on this curious divergence of opinion, says that the only explanation is that trade opinions are based mainly upon external appearances. The sample is unlike the ordinary article met with in the market, and probably bears some resemblance to an inferior grade known to dealers. 'As a general rule, the commercial expert is lost if carried out of the field of comparative valuations. He knows little or nothing of chemistry.' That

is true, of course, but the trade opinion shows that cutch prepared by the vacuum process, though pronounced by chemical examination to be of great purity and good appearance, will not, for the present at least, secure anything like a good price in the market."

## THE ALKALOIDS OF VERATRUM.

George B. Frankforter, in *Minnesota Botannical Studies*, Bulletin No. 9, May 31, 1897, gives an elaborate review of the veratrums, but especially mentions V. viride, which is the only one occurring in Minnesota. Its general range in North America, under the popular name of Hellebore, is a broad one.

The substance commonly known in pharmacy as veratrine, varies widely in its composition, chemical, physical and physiological properties. The introduction of the so-called "Merck veratrine" has changed matters somewhat, although samples of the Merck alkaloid have been found to vary considerably in their general properties. One of the chief causes of this exceptional variation is the extreme difficulty with which the alkaloid crystallizes, thus almost excluding the most important means of purification. Another, and perhaps the most important reason for this wide variation, lies in the fact that almost every one of the early investigators of the "veratria" has given the name to a different alkaloid, or to a mixture of alkaloids.

The foregoing introduction is followed by a concise history, beginning in 1819 with the work of Pelletier and Caventou on Veratrum sabadilla and following it step by step down to Salzberger, who in 1890 made an exhaustive examination of Veratrum album.

Then follows the "experimental part" in which the author operated on a sample of crystallized veratrine which was of a light gray color, and appeared, when highly magnified, in imperfect granular crystals. It was slightly soluble in water, very soluble in methyl, ethyl and amyl alcohols, and in ether, acetone, chloroform and carbon disulphide. Its melting point after repurifying was 146 to 148° C., and its identity with that described by Merck and Ahrens was established by elementary analysis, as well as by the melting point of the gold double salt. The formula was made out to be $C_{32}H_{49}NO_9H_2O$.

The following iodine compounds were prepared and studied:

Veratrine tetraiodide, $C_{32}H_{49}NO_9I_4 . {}_3H_2O$
" triiodide, $C_{32}H_{49}NO_9I_3$
" monoiodide, $C_{32}H_{49}NO_9I$

Other compounds were prepared and investigated as follows:

Chloralhydroveratride, $C\ Cl_3\ CH\ (OC_{32}H_{49}NO_8)_2$
Veratrine methyliodide, $C_{32}H_{49}NO_9CH_3I$.
" methylhydroxide, $C_{32}H_{49}NO_9CH_3OH$.
" methylhydroxyhydrochloride. $C_{32}H_{49}NO_9CH_3OH$. HCl.
" ethylbromide, $C_{32}H_{49}NO_9C_2H_5Br$.
" allyliodide, $C_{32}H_{49}NO_9C_3H_5I$.

The author concludes with the statement that the structural formula of veratrine is still a mystery. From the odor of picoline by a destructive distillation, and the isolation of $\beta$ Picoline by Ahrens, it is evident that veratine is a pyridine derivative, resembling in many respects nicotine. Whether both cevadic and tiglic acids are present, remains for future experiments to determine. The work of Schmidt and Köppen indicates the presence of both acids, while the careful researches of Wright and Luff would indicate that these isomeric acids are converted into each other by special reagents. Assuming that but one acid is present, the following formula may be assigned to veratrine:

$$C_{21}H_{30}O_5 \begin{cases} OCH_3 \\ OOCCH\ (CH_3)\ CH_3 \\ OH \\ NH_7C_6 \end{cases}$$

Experiments at present are being conducted along this line, with the hope of throwing more light on the structure of this important compound.

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## EDITORIAL.

### THE AMERICAN MEDICAL ASSOCIATION.

The Jubilee Meeting of this Association, held in Philadelphia, June 1 to 4, inclusive, was a notable one in many respects. Not only was the attendance of 2,500 members unusual, but the deluge of papers presented in the various sections attested the industry of the members during the past year. The founder of the Association, Dr. N. S. Davis, of Chicago, and one of the first secretaries, Dr. Alfred Stillé, of Philadelphia, were both present at the meeting. The former delivered an address entitled: "A Brief History of the Origin of the

American Medical Association." This address is not only very interesting, but it is a document of considerable historical value, for Dr. Davis is almost the only one who can speak with authority on this subject. He first briefly outlined the early history of the country, and called attention to the fact that, springing as it did from a few States, which had achieved independence, the Government was confronted with many difficult problems, the one of education by no means being the least; but it was decided to leave that important subject to the regulation of individual States.

Our educational history as an independent people commenced thus, during the last half of the last quarter of the eighteenth century, in a new and sparsely populated country, extending from Maine to Florida, with only four medical schools organized, all as departments of literary colleges or universities, and all attracting annually attendance of less than 300 students, of whom not more than fifteen annually received the degree of Doctor of Medicine, and no two of them controlled by the laws of the same State. And it must be noted, also, that a very large majority of those who entered upon the practice of medicine at that time gained their education in the office of some established practitioner, and were licensed by the censors of medical societies, the judges of courts, or even by the certificates of their preceptor, without ever having spent a day in a medical college.

After thus outlining the early history, the speaker came to the years 1846–47, when the Association was organized, when it was found that colleges had multiplied until thirty were in existence, with an annual attendance of 3,500 students, of whom not less than 1,000 received the degree of Doctor of Medicine. This rapid increase in the number of colleges necessarily led to the most active rivalry.

So potential was the question: "In which school can I obtain the degree of Doctor of Medicine for the least expenditure of time and money?" on the several medical schools, that, although the three medical schools originally organized in Philadelphia, New York and Boston had been founded on the same basis or curriculum as the University of Edinburgh, requiring a good academic education as a preliminary for entering the medical course, then from three to five years of medical study, with annual college terms of not less than six months, long before the number of our medical schools had reached thirty, all preliminary requirements had been abandoned, the term of medical study limited to a nominal three years, and the medical college instruction to two annual repetitional courses of from twelve to sixteen weeks each. Under this inadequate and unsystematic medical education it really cost less in time and money to obtain the degree of Doctor of Medicine than it had previously cost to serve an apprenticeship in the office of a respectable practitioner, and obtain a license from the censors of a local medical society.

Such a deplorable condition naturally led to a desire on the part of many for reform, which, it was said, could only be effected by organization. As early as 1835 the faculty of the Medical College of Georgia urged, through the medical press and by correspondence, the holding of a National Convention. This and several other attempts failed, until, in 1846, Dr. Davis and a few associates effected organization in New York, and arranged for meeting in Philadelphia in May, 1847.

The speaker then detailed the business of the first meeting, named the officers of that meeting, and concluded as follows:

Such is a brief history of the *origin*, *objects* and *organization* of the American Medical Association, which, with the exception of the first two years of the great war for the preservation of the Union of these States, has held its regular annual meetings in all the important parts of our widely-extending country, still adhering tenaciously to the fundamental principles on which it was founded. And I am most happy to add that every leading object sought to be accomplished by its founders has been substantially obtained; that is, universal, free and friendly, social and professional intercourse has been established; the advancement of

medical science and literature in all their relations has been promoted, and the long agitated subject of medical education has reached the solid basis of a fair academic education as a preparatory, four years of medical study, attendance on four annual courses of graded medical college instruction of from six to nine months each, and licenses to practice to be granted only by State Boards of Medical Examiners.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The Standard Manual of Soda and Other Beverages. By A. Emil Hiss, Ph.G. G. P. Engelhard & Co., Chicago. 1897.

Quite recently we reviewed in this Journal, *The Standard Formulary*, in which the author of the present work was associated in joint authorship with Mr. A. E. Ebert. The Standard Manual is, therefore, a fitting companion to its predecessor.

Chapter I is devoted to historical considerations, and is a compact statement of the growth of the enormous industry in which "soda water" is the foundation.

The second chapter is made up of such general directions as making carbonated water, discharging the generator, and all the other manipulations connected with making and dispensing beverages. The remainder of the book, amounting to nine-tenths, is devoted to formulas, in which nearly every conceivable, and some inconceivable, "soda water" beverages receive attention. "In the soda water drinks, all spirituous preparations have been omitted, except in certain well-known standard articles, and in the formulas received from special contributors."

Flowers of Field, Hill and Swamp. By Caroline A. Creevy, author of Recreations in Botany. The foregoing is the title of a book recently published by Harper & Brothers, New York.

It is a botanical work, intended to instruct persons who have no technical knowledge of botany in the art of classifying and naming many of our common Eastern flowering plants.

Such works, when properly presented, are of great benefit. They appeal to persons who are interested in flowers, but who are deterred from taking up the study of botany on account of the dreaded "technical names" which in such cases are administered in a palatable form.

It is a matter of great regret that a book indicating such a large amount of painstaking work on the part of the author, and representing such a high degree of typographical skill, should be marred by so many inaccuracies in the illustrations which accompany the descriptions of many of the plants.

Written descriptions are often ambiguous because of their great latitude; but in illustrating a plant it should be remembered that the persons receiving instruction are apt to look upon a cut as an absolute likeness of the plant, whereas, in many cases, a dozen illustrations would be necessary to give an idea of the variety of forms assumed by a single species under varying conditions.

In the present work some of the cuts are not of typical forms, but of abnormal species, being probably taken from a single herbarium specimen in many instances. The illustrations of spearmint, on page 19, and bugleweed, on page 71, might be transposed to advantage, as neither is correct, while an interchange would be an improvement upon accuracy.

The frontispiece shows Hepatica triloba, or liverleaf, in a most luxuriant state, with numerous flowers and fully-developed leaves at the same time; the early spring leaf-buds, which invariably accompany the typical specimen, being entirely absent, while the previous year's leaves, which in nature are usually flat on the earth and covered up, are erect and flourishing in appearance.

Oxalis corniculata, var. stricta, yellow-wood sorrel, as seen on page 182, is a midsummer form of the plant, very different from that commonly observed and almost unrecognizable.

Lysimachia quadrifolia, four-leaved loosestrife, page 337, is another illustration very misleading in its character. Instances multiply rapidly, but the following are all liable to similar criticism: Hypericum perforatum, St. Johnswort, page 237; Campanula rotundifolia, harebell, page 291; Apocynum androsæmifolium, dogsbane, page 5 21, and Linaria canadensis, blue toad-flax, page 421.

The work contains descriptions of a very large number of plants, the arrangement being upon a novel basis, and one of doubtful advantage, *i. e.*, the character of the habitat, such as "banks of streams, in swamps, in water, in low meadows, along waysides and in dry fields, escaped from gardens, weeds, open dry woods, deep cool woods, etc."

In nature no boundaries exist that will allow of certain classification of plants in general in this manner, and it is to be feared that the person who attempts to classify plants by this book will not care to go further into the science. CHARLES H. LAWALL.

NOTES ON THE PLANTS USED BY THE KLAMATH INDIANS OF OREGON. By Frederick V. Coville. Contributions from the U. S. National Herbarium, Vol. 5, No. 2. Issued June 9, 1897.

While engaged in a botanical survey of the plains of southeastern Oregon, in the summer of 1896, the author spent three days, August 21st to 23d, at Fort Klamath and the Klamath Indian Agency, where he was enabled to secure information as to the principal plants used by the Klamath Indians. Most of the information was obtained from Joe Kirk, an educated Klamath Indian, and from White Cindy, a Klamath medicine woman. The Government agents living at the fort also furnished much information. A large number of plants, covering nearly the whole range of natural orders are given. Two lichens are represented; one, Alectoria fremontii, as a famine food; and the other, Evernia vulpina, on account of its yellow dye. Equisetum hyemale is used to smooth arrow shafts just as a carpenter uses sand-paper. A number of the Pinaceæ are used for various purposes. The seeds of Pinus Lambertiana are used as food, but no mention is made of the sugar, which is used as food or medicine by the California Indians. Some of the pines are used as twirling sticks, to produce fire by friction, although the sage brush, Artemisia tridentata, is said to be better for this purpose. These illustrations will serve to give an idea of the scope of this work, which, however, is only a pamphlet of 32 pages. Nevertheless, it is full of valuable information.

MINNESOTA BOTANICAL STUDIES. Bulletin No. 9, Parts X and XI. Geological and Natural History Survey of Minnesota. Conway MacMillan, State Botanist.

This large bulletin of 342 pages and 42 plates is full of interesting matter relating to botany.

The following are the contents :

"Contributions to a Knowledge of the Lichens of Minnesota." II. "Lichens of Minneapolis and Vicinity." By Bruce Fink.

"A Rearrangement of the North American Hypomycetes." By Roscoe Pound and Frederic E. Clements.

"On Some Mosses at High Altitudes." By J. M. Holzinger.

"The Forces Determining the Position of Dorsiventral Leaves." By R. N. Day.

"On the Genus Coscinodon in Minnesota." By J. M. Holzinger.

"Observations on the Ferns and Flowering Plants of the Hawaiian Islands." By A. A. Heller.

"The Phenomena of Symbiosis." By Albert Schneider.

"Observations on the Distribution of Plants Along the Shore at Lake of the Woods." By Conway MacMillan.

"The Alkaloids of Veratrum." By George B. Frankforter.

The last article is given in abstract on page 372 of this JOURNAL.

A SERIES OF PAPERS ON THE ORIGIN AND CHEMICAL COMPOSITION OF PETROLEUM. Read before the American Philosophical Society, February 5, 1897.

This interesting series has been reprinted from the Proceedings of the Society, and bound together, so as to make a compact pamphlet for reference.

The following are the subjects and authors :

"The Genesis and Chemical Relations of Petroleum and Natural Gas." By Samuel P. Sadtler, Ph.D.

"On the Nature and Origin of Petroleum." By S. F. Peckham.

"A Suggestion as to the Origin of Pennsylvania Petroleum." By David T. Day.

"On the Genesis of Natural Gas and Petroleum." By Francis C. Phillips.

"On the Occurrence of Petroleum in the Cavities of Fossils." By Francis C. Phillips.

"On the Composition of American Petroleum." By Charles F. Mabery.

The discussion which followed the reading of these papers is also included in the pamphlet.

A REVIEW OF RECENT SYNTHETIC WORK IN THE CLASS OF CARBOHYDRATES. By Helen Abbott Michael.

This is a lecture delivered before the Franklin Institute, and reprinted from the Institute's *Journal*. It is a valuable summary of the present knowledge of the sugar group.

SUR LE DOSAGE DE LA CAFEINE. Thesis presented to the *École Supérieure de Pharmacie de Paris*. By Eugene Tassilly. The author has examined some of the methods already proposed, and offered one which he thinks possesses the advantages of all the earlier processes, and, at the same time, avoids their disadvantages. A summary of the literature on the subject is given from 1872 to the present.

QUELQUES OXYDES DOUBLES CRISTALLISÉS OBTENUS A HAUTE TEMPERA-

TURE. Thesis presented to the *École Supérieure de Pharmacie de Paris.* By M. Dufau (Louis-Émile-René).

BULLETIN. Vol. II, No. 7. *Imperial University, College of Agriculture,* Tokyo, Japan.

This number, like its predecessors, is full of valuable matter relating chiefly to physiological botany. The first article is a continuation by Dr. Loew, of the study of living protoplasm. We have also received one of the articles, as a separate, "On the Formation of Asparagine in Plants under Different Conditions." By U. Suzuki. *Bulletin,* Vol. III, No. 1, has also been received. Its 113 pages are devoted entirely to an exhaustive consideration by Professor Dr. Diro Kitao, to the one subject—"Ueber die Wasserbewegung in Böden."

PAPAIN; the vegetable pepsin, its origin, properties, and uses. Lehn & Fink, New York.

ANTITOXINS. The G. F. Harvey Company. An illustrated pamphlet, giving much historical matter and considerable clinical data on the use of this important remedy.

THE ACTION OF TAKA-DIASTASE IN VARIOUS GASTRIC DISORDERS. By Julius Friedenwald, A.B., M.D. Reprinted from the *New York Medical Journal,* for May 29, 1897.

REPORT OF PROCEEDINGS OF THE ILLINOIS PHARMACEUTICAL ASSOCIATION. Seventeenth Annual Meeting, 1896.

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## PENNSYLVANIA PHARMACEUTICAL ASSOCIATION.

The twentieth annual meeting of the Pennsylvania Pharmaceutical Association convened in the parlor of the Kittatinny House, Delaware Water Gap, Pennsylvania, on Tuesday, June 22, 1897.

The first session was called to order by President Joseph P. Remington, at 4.48 P.M. About seventy-five persons were present. The Secretary was asked to read a letter of welcome, which had been received from the chief burgess of the borough of the Delaware Water Gap, Mr. E. R. Johnson. The President asked Mr. M. N. Kline to reply to this courtesy. The routine of business was then begun by the Secretary acknowledging the receipt of the credentials of delegates from the following bodies: Philadelphia College of Pharmacy, National Wholesale Druggists' Association, New Jersey Pharmaceutical Association, Maryland Pharmaceutical Association and the Proprietors' Association. The President then delivered his address. It was referred to a committee for consideration.

The reports of the Committee on Entertainment and of the Secretary were then presented; they were referred to the Committee on Publication. The report of the Treasurer showed a comfortable balance, and that the association had at the time of the report 312 members in good standing. It was referred to an auditing committee appointed by the chair. The report of the Executive Committee stated that the project of holding a joint meeting of the Pennsylvania and Maryland Pharmaceutical Associations had met with favor. The chairman of this committee reported two applications for membership which had

been made since the last meeting, also seven deaths among members. The report was referred to the Committee on Publication. The President then appointed committees on nominations and place of next meeting. It was then voted to adjourn until 9.30 the following morning.

The second session, which met on Wednesday morning, was mainly occupied by the reading of reports of committees and of delegates to pharmaceutical and medical associations. The following officers were elected for the ensuing year: President, J. H. Redsecker; Vice-Presidents, J. H. Knouse and W. L. Cliffe; Treasurer, J. L. Lemberger; Secretary, J. A. Miller; Executive Committe, G. W. Roland, C. L. Hay and W. F. Horn. The Committee on Adulteration reported that they had been successful in securing a new law against this practice. Under the old law it was difficult to conduct prosecutions, owing to the wording of the Act; in the new law this was thought to have been overcome. The committee reported that comparatively few adulterations had presented themselves during the past year. Attention was directed to the fact that if pharmacists insist upon jobbers supplying goods which meet the standards of the United States Pharmacopœia and the National Formulary, without regard to brands, they will get them, and without additional cost. President Remington advised the Association, when it undertook a prosecution, to select some article upon which it would undoubtedly win the case, and not one upon which the Association might be liable to defeat by the lawyers proving that the impurity or adulteration was as good for the purpose as the article said to be adulterated. He cited the contamination of carbolic acid with cresylic acid as an illustration of an impurity which was of equal or greater value as a disinfectant than the substance with which it was mixed.

The next report was that of the Committee on Botany. It was chiefly confined to an enumeration of plants and trees of that part of Pennsylvania east of the Susquehanna River. The committee suggested the adoption, as far as possible, of the proper scientific names for plants, as their meanings are usually sufficiently specific to distinguish one plant from its congeners. The report directed the attention of pharmacists to the deforestration of our immense natural woodlands and the changes in meteorological and climatic conditions which follow the destruction of forests. It suggested that an effort be made to mitigate the evil by enacting and enforcing suitable laws.

The principle issue of the report of the committee to attend the National Wholesale Druggists' Association, was a question as to the legitamacy of pharmacists buying *phenacetine* through other channels than the authorized agents, who charge much more for what is represented to be the same article and sold for less by the unauthorized dealers. This feature of the report elicited considerable discussion, and it was made apparent that the Association objected to the protection which the present copyright laws give to manufacturers who try to sell a well-defined and well-known chemical under a fancy name. To overcome this state of affairs, F. W. E. Stedem moved that the Association secure the co-operation of the American Pharmaceutical Association and the American Medical Association in an effort to have the copyright laws of the United States on definite chemical compounds revised. It was stated that the Pennsylvania State Medical Society has pledged itself to co-operate with the American Medical Association for the repeal of such copyright laws.

The committee on time and place of meeting, announced that the next annual

meeting will be held at Buena Vista Hotel, Franklin County, Pa. The time will be reported later, as it will be a joint meeting with the Maryland Pharmaceutical Association, which will convene in its own State, just across the Mason and Dixon line. F. B. Flemmings, of Shippensburg, was appointed local secretary. The delegates to the State Medical Society reported that samples of about 2,000 preparations had been exhibited before the meeting of this body in Pittsburgh. It was evident that this committee, of which Prof. Louis Emanuel was chairman, had done a great work toward attracting the attention of the members of the foregoing society to the preparations of the United States Pharmacopœia and the National Formulary. Prof. Emanuel proposed that a committee be appointed to consider the feasibility of establishing a literary bureau from which printed matter on National Formulary and other preparations might be drawn for distribution among physicians, for the purpose of combatting the advertisements of copyrighted articles. This, and the other consideration of copyrighted articles, were referred to a committee composed of Messrs. Stedem, George, Emanuel, Redsecker and Kennedy. During the discussion which followed the last report, F. W. E. Stedem proposed a mixture of the spirit of orange of the National Formulary, and glycerin in equal quantities, as a vehicle for bromoform; its advantages are pleasant taste and solvent power on the medicament. Prof. Emanuel moved that Prof. Beal's ideal pharmacy law, which was distributed among the State associations and boards of pharmacy, by the American Pharmaceutical Association, be referred to the Committee on Legislation. It was so ordered. The auditing committee approved the treasurer's report. The presentation of papers then followed.

"The Flora of Bushkill Falls" was the title of a paper read by Adolph W. Miller, M.D., Ph.D. This contribution was an account of a botanizing tour made by the Philadelphia Botanical Club and the Torrey Botanical Club, of New York, through the district of Bushkill, Pike County, Pa., on May 28th last. Dr. Miller was one of the party which explored this rich region. He called particular attention to the following plants: the American yew, the gold thread, Rhododendron maximum, R. nudiflorum, R. canescens, Kalmia latifolia, K. angustifolia, Vacineum stamineum, Cypripedium hirsutum (formerly called C. pubescens), Orchis spectabilis, Cystopteris bulbifera, Camptosorus rhizophyllus, Osmunda struthiopteris, many forms of the Napoleon flower, and Scrophularia leporella (recently separated from S. nodosa by Bicknell).

Attention was also called to the abundance, in the neighborhood of the Taraxacum erythrosperma, Andrz, which, until quite recently, was included in the official species, the Taraxacum officinale, although it was described as early as 1821, by Anton Andrzejowski, whose name is attached to it. It differs in many particulars from the official plant, notably in the color of its achenes, which are crimson, bright red or reddish-brown, whence it received the title "erythrosperma." Its pappus is slightly tawny, or dirty white in color; its leaves are far more deeply divided into narrowly triangular segments, and the whole plant is rather smaller in size than the Taraxicum officinale. While a head of the latter may be made up of 160 to 170 individual florets, one of the red seeded species does not contain more than 70 to 80. The head itself is smaller, being scarcely an inch in diameter, and the fruiting receptacle is rarely more than one-quarter inch broad. There seems to be also a slight difference in the color of the head, that of the Taraxacum erythrosperma being rather more of a sul-

phur or lemon-yellow color than the other. The inner bracts of the involucre are nearly all furnished with a peculiar corniculate appendage, half a line or so below the whitish tip, and the outer ligules of the head are somewhat purplish on the external surface. A specimen of the T. erythrosperma presents a much more matted, or interlaced appearance in its growth than the taller species. As the T. officinale 'Weber' is undoubtedly an introduced plant from Europe, it is just possible that the T. erythrosperma is a native of America. Appended to the paper was a list of 275 plants, most of which were found in bloom. The next paper was "On the Presence of Corrosiue Sublimate in Calomel," by Lyman F. Kebler. It is printed in full on page 338 of this issue.

In reply to the query: *Should drug store experience in pharmaceutical education precede or follow college training?* Theodore Campbell presented a paper in which he earnestly urged every druggist to see that his clerks have not less than one year of experience in the store before attending lectures at a college of pharmacy. The author showed that a clerk who has had such experience will be better prepared to receive the college instruction, and that drug store training previous to attendance at college qualifies a person to open a store and conduct the business in all its phases immediately after graduation from a college.

William B. Thompson contributed a paper entitled "A Pertinent Query," which was, in effect, a presentation and discussion of the question as to whether the practice of pharmacy may rightly be regarded as a profession. His arguments were convincing, and left little doubt that he who fills the various requirements of this calling is justly entitled to a professional standing.

Another paper by Mr. Thompson was on the subject of "Chlorinated Lime in Zinc Containers." In this he stated that the method of packing chlorinated lime in cans made of sheet zinc had been employed a sufficient length of time to thoroughly test its merits. He observed that the article stored in this manner preserved its condition unimpaired for a reasonable period.

Wm. McIntire suggested that the package be labelled with the date of packing and the strength of the substance at that time.

The query: *should druggists study medicine?* was answered in the affirmative by W. H. Reed. The ethical relations of the professions of pharmacy and medicine as such, and as they were formerly practiced, were first defined by the author. He then considered the complications of the two classes as they now exist, and favored the adoption by druggists of measures adapted to the changed conditions brought about by modern business innovations.

He said that druggists were protected by legal enactments only in the dispensing of poisons and compounding of prescriptions; and he believed that not more than one-fourth of the present drug stores could subsist on this kind of patronage alone. He also said that the average drug store now without the aid of a physician is not a success financially. He, therefore, recommended the practice of medicine in connection with that of pharmacy, under certain conditions, both as a means of success and to meet the demands of certain classes of patrons, namely, those affected with disorders of a transient nature, and those with limited means.

The writer furthermore believed that where he is legally qualified, the druggist is as morally justified in practicing medicine in connection with pharmacy as the physician is justified in supplying his patients with drugs, and thereby injuring the business interests of the pharmacist.

Another reason which he advanced for druggists studying medicine, even though they did not intend to practice it, was that a medical training would be of inestimable value to them in the practice of general pharmacy.

Under the head of "Rocks and Shoals of Pharmacy," Prof. C. B. Lowe presented some common-sense doctrine, which was particularly intended for young men beginning the drug business. Of the hindrances to success in this business, he considered the following: Immorality, insufficient capital, extravagance in fitting up the store, purchase of large quantities of stock ahead of the demand, or purchase of stock on account of its cheapness, too early marriage, insufficient education, lack of business methods with regard to the workings of the store, carelessness in financial details, want of politeness, neglect of health, neglect of certain kinds of advertising, and finally, lack of pharmaceutical literature.

"Cold Cream" was the subject of a paper by F. W. E. Stedem.

It was as follows: "Since the last revision of the United States Pharmacopœia, many complaints have been made by physicians as to the deterioration of ointments of metallic oxides and other medicinal substances, when made with unguentum aquae rosae as the unction vehicle. The cause of these rapid changes is due to admixture of a small per cent. of borax, which has been added because of its saponifying the oil of almond partially, and thereby holding the rose water in suspension all the more readily. My experience with both formulas has led me to the firm conviction that the change to the use of borax was a very unwise one, for many reasons. The first objection is illustrated in a series of ointments of various mercurials in daily use, and the results are, on inspection, obvious. These preparations were made on May 10, 1897, a little over a month ago, and in all cases one would be unable to recognize the mixtures. The preparation of ointment of yellow oxide of mercury is particularly objectionable, and its unsightliness is not the least of its failings. This ointment is frequently ordered by physicians for use on the eye, and when made with official cold cream, is totally unfit for use, because of the terribly irritating properties of the reduction product. It is not the desire of the writer to prolong the line because of its length, beyond submitting these specimens, including an ointment of yellow oxide of mercury, a dilution of ointment of nitrate of mercury, and an ointment of red oxide of mercury. It is a question as to whether the change from the Pharmacopœia of 1880 was not made in deference to a demand from those who are simply unwilling to work hard in an effort to get a good or fit preparation. There is no difficulty in making a good and sightly mixture by the old process when worked right and long enough. It would be much better to drop the preparation entirely from the Pharmacopœia than to continue it and make it necessary for us to keep both preparations in stock, for the reasons given before."

This paper was commented on at length; other members reported trouble from the same source, and also dissatisfaction with the changes which had been made in some other official preparations. Prof. Moerk mentioned the discoloration which happens when resorcin or hydroqinone is mixed with official cold cream or other substances which contain alkaline bodies. The paper was referred to the Association's committee on the revision of the United States Pharmacopœia.

Prof. F. X. Moerk then read an interesting contribution entitled "Notes on Opium Assaying;" see page 344 of this number.

"Analytical Processes and Laboratory Notes," by C. H. LaWall followed. This paper may be seen in full by referring to page 350.

The Committee on Membership reported thirteen new members. The Secretary read a telegram bearing fraternal greeting from the Colorado Pharmaceutical Association, which was in session at the time. He returned the courtesy on behalf of the Pennsylvania Association.

The Committee on Legislation reported that the pharmacy law known as an act to regulate the practice of pharmacy, sale of poisons, etc., approved May 24, 1887, and subsequently amended in June, 1891 and June, 1895, upon being tested as to its efficiency to meet the requirements and purposes for which it had been enacted, failed to withstand the crucial test of the courts. The first section was declared unconstitutional by the Superior Court on January 29, 1897, on account of the so-called unlimited widow's clause, which decision, on an appeal, was sustained by the Supreme Court on May 7, 1897. The committee at once began work to secure the speedy enactment of a new law, which would be free from the objections that had brought such disastrous results to the former law. With this object in view, a bill was introduced in the House on March 1, 1897, and one of like import was introduced in the Senate on March 15, 1897. This latter bill passed second reading in the Senate. The House bill met with a formidable resistance, and was amended in such manner as to require compulsory registration of physicians as pharmacists without the semblance even of an examination by the pharmacy board. This provision met with a determined opposition, and its advocates were notified that the pharmacists of the State would never accept legislation of that character, but would demand and insist upon the enactment of such legislation as would place them on a parity with the laws governing the medical profession. Some 12,000 to 15,000 circulars and reprints of bills, including petitions to be signed and forwarded to the members of the Senate and House, were mailed to the druggists throughout the State, with the gratifying effect of arousing an almost united sentiment in favor of the original measure and against the proposed amendment; and the committee had the satisfaction of the prompt passage by the House of the bill without the objectionable amendment. The bill was next passed by the Senate, but with a further slight amendment, which the committee feels sure will be accepted and promptly concurred in by the House. The following is a copy of the bill:

An act supplementary to an act entitled An act to regulate the practice of pharmacy and sale of poisons and to prevent adulterations in drugs and medicinal preparations in the State of Pennsylvania, approved the twenty-fourth day of May, Anno Domini one thousand eight hundred and eighty-seven, further regulating the practice of pharmacy, the compounding and dispensing of prescriptions and the sale of drugs, chemicals, medicines and poisons, and providing a penalty for the violation thereof.

SECTION 1.—Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the same, That hereafter no person whosoever shall, directly or indirectly, open or carry on in the State of Pennsylvania any retail drug store or chemical store, or compound or dispense medicines or prescriptions of physicians, or engage in the business of selling at retail any drugs, chemicals, poisons or medicines without having obtained a certificate of competency and qualification so to do from the State Pharmaceutical Examining Board, and without having been duly

registered by said board. Any person who shall violate or fail to comply with the provisions of this section shall be guilty of a misdemeanor, and on conviction before any court shall be punished by a fine not exceeding one hundred dollars; Provided, however, that nothing in this act contained shall in any manner whatever be taken or construed to prohibit any practitioner of medicine from supplying to his patients such articles as he may deem proper, nor to interfere with the making and dealing in proprietary medicines, nor to prevent storekeepers from dealing in and selling the commonly used medicines and poisons as now permitted by the sixth section of the act to which this is a supplement. And provided, also, that the legal representatives of any deceased registered pharmacist may, for the purpose of administration of his estate, be permitted by the Orphans' Court of the proper county to continue the business for not exceeding one year under the management of a duly registered pharmacist.

SECTION 2.—The term commonly used medicines and poisons relating to storekeepers is defined as simple and harmless household remedies which can be handled with safety by the uneducated, as essence of ginger, peppermint, Hoffman's anoydyne, castor oil, sweet oil and drugs of like character, and to exclude all dangerous and highly concentrated remedies, alkaloids, fluid and solid extracts, and drugs, such as opium, morphine, cocaine, chloral hydrate and drugs of like character, and poisons in the same case to mean only such well known drugs and chemicals as are used by farmers and truckers as insecticides, as Paris green, royal purple, powdered hellebore, sulphate of copper and drugs of like character.

A bill already referred to in this report and known as the "Adulteration Bill," was signed by Governor Hastings on May 25th last. It is:

An act to prevent the adulteration, alteration and substitution of drugs and medicinal preparations; and providing penalties for violation thereof.

SECTION 1.—Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That no person shall within this State manufacture for sale, offer for sale or sell any drug which is adulterated within the meaning of this act. The term drug used herein shall include any medicinal substance or any preparation authorized or known in the *Pharmacopœia of the United States or the National Formulary* or the *American Homœpathic Pharmacopœia or the American Homœpathic Dispensatory*. A drug shall be deemed to be adulterated within the meaning of this act,

(1) If any substance or substances have been mixed with it so as to depreciate and weaken its strength, purity or quality.

(2) If any quality, substance or ingredient be abstracted so as to deteriorate or affect injuriously the quality or potency of the drug.

(3) If any inferior or cheaper substance or substances have been substituted in whole or part for it.

(4) If it is an imitation or is sold under the name of another drug.

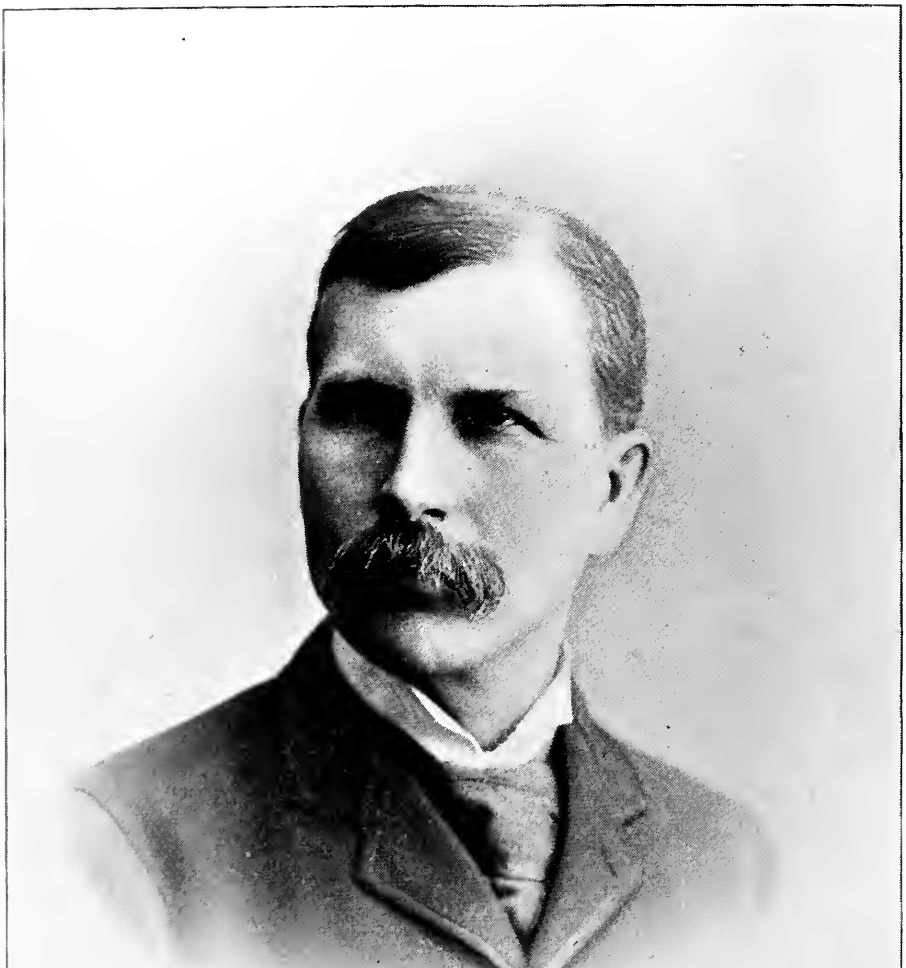
(5) If the drug shall be so altered that the nature, quality, substance, commercial value or medicinal value of it will not correspond to the recognized formulæ or tests of the latest edition of the *National Formulary* or of the *Pharmacopœia of the United States* or the *American Homœpathic Pharmacopœia* or the *American Homœpathic Dispensatory* regarding quality or purity.

On complaint being entered the State Pharmaceutical Examining Board is hereby empowered to employ an analyst or chemical expert, whose duty it shall be to examine into the so-called adulteration and report upon the result of his investigation, and if said report justifies such action, the board shall duly cause the prosecution of the offender as provided in this law. Whoever violates any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction shall be fined a sum not exceeding one hundred dollars nor less than fifty dollars, or undergo an imprisonment not exceeding ninety days nor less than thirty days, or both.

SECTION 2.—All laws or parts of inconsistent laws herewith are hereby repealed.

A vote of thanks was extended to the Committee on Legislation and to the members of the Legislature who had worked for and supported the measures.

The officers for the coming year were installed at the last session, on Thursday evening. The entertainment provided for the meeting by the committee in charge was of an interesting character, well attended and much enjoyed by all present.



Edson S. Bastin.

THE AMERICAN

# JOURNAL OF PHARMACY

*AUGUST, 1897.*


## MEMOIR OF EDSON SEWELL BASTIN.

Death at best is a sad subject, but it becomes doubly so when, as was the case with Professor Bastin, the victim is cut down in the very zenith of his strength and usefulness. Beginning as a pioneer in what was then the far West, he naturally reached his full scientific development later than those who start surrounded with every educational facility, and who need to give no thought to the financial questions which usually attend the attainment of an education. But what he lost in time he gained in having a broader and more practical knowledge, which enabled him to more than make up in later years what he lost in early life.

The subject of this memoir was born May 29, 1843, in the southern part of Ozaukee County, Wis., on the southern shore of Lake Michigan, near what was then the village of Milwaukee. His parents, probably of remote French ancestry, had come there from northern New York some time previously. His father was a strong-resolute and daring man, with rather a restless temperament. His mother was sought for in that sparsely settled district by the neighbors in times of sickness; their ailments she relieved to the best of her knowledge and ability by the use of medicinal herbs, gathered and prepared by her own hands.

The boyhood of Professor Bastin was divided between farm work in summer and attendance at the district schools in winter. The family afterward moved to Wauwatsa, Wis., and then to Waukesha, in the same State.

The rugged life on a pioneer farm developed the latent energies of the boy, and he became self-reliant and fearless. He would engage in hunting in the depths of the forest, either day or night, and he was as successful in that important part of the pioneer's life as he was in the numerous other duties. His mother died when he was but twelve years of age, and his father was killed by accident some ten years later.

In 1859, while in his sixteenth year, he entered Carroll College, at Waukesha, Wis., and remained there until 1862, when the war spirit took possession of him, as it did of many others at that time. He entered the Twenty-eighth Wisconsin Infantry, which regiment became attached to the Army of the West, and engaged in the Arkansas campaign. This regiment experienced long, severe marches, much sickness and other privations, with the tedium unrelieved by the presence of the enemy until they reached Helena, Ark., where a battle was fought and won on July 4, 1863, and in the same year Little Rock was captured.

Soon after this, partly on account of illness, which unfitted him for field duty, and partly because of his clerical abilities, Professor Bastin was detached from his company and employed as a clerk at headquarters. After a year's service in this capacity, he was, in 1864, commissioned captain of the Fourth Arkansas Cavalry; this appointment was the result of a competitive examination. The young captain was, from this time to the end of the war, engaged actively in scouting and picket service, in which he won a high reputation for ability and bravery, and, through the voluntary recommendations of his superior officers, he was offered a cadetship at West Point. He, however, had no taste for military life in times of peace, and declined the honor. Instead of this, he entered Chicago University as a student, where he graduated in 1867.

Following this, he took a course of some three years in the same institution, in theology, which course he completed in 1870, with the degree of Bachelor of Divinity. His character at this time can best be understood by the following extract from an address at his funeral by one of his classmates, the Rev. Dr. John Gordon:

I became acquainted with Professor Bastin while in his senior year in the old University of Chicago, and was associated with him for four years in the class-rooms of the college and Theological Seminary. He first impressed me as being somewhat cold in manner, but on better acquaintance I found this

was simply his natural reserve, and that he possessed a warm and tender heart, which bestowed its affection more and more as the years went by.

As a student he was respected by professors and classmates because of his deportment, faithfulness and sincerity. He was always well prepared for recitation or examination, and never did things in a slip-shod manner. The testimony of his students in the Philadelphia College of Pharmacy to his exacting demands for honest work from them fittingly expresses his own early convictions and habits when a student.

Professor Bastin was a modest, unassuming young man, and never, until today, did I know that he had served in the army during the late civil war. His record as a soldier is one of which any man might justly be proud, and yet during all my four years' acquaintance with him I never heard him speak of the war.

We now come to a turning-point in the life of Professor Bastin, where, instead of following the ministry, for which his education had prepared him, he became interested in the natural sciences, particularly the science of botany. This subject had been studied by him in a variety of ways from his early youth, and the writer has heard him speak of the observations he made on the flora of Arkansas, while doing duty as a soldier there; consequently, "true as the needle to the pole," when in 1871 he was deciding on his life-work he came back to this same subject. He selected the drug business as a means to the end which he wished to accomplish, and for the next few years, while engaged in the duties of apothecary in Chicago, he gave much time to the study of botany and its allied sciences. In 1873 he married Christina Boyd, and shortly after disposed of his drug business. His reputation won in the civil war secured for him an appointment as United States Marshal, and he moved with his wife to the scene of his duty in Indian Territory. The experience in this lawless region was of the most thrilling character, and often exposed him to great danger, but his cool judgment, thorough horsemanship, as well as his ability to use firearms to the greatest advantage, brought him safely through every conflict. His wife, however, could not endure the nerve strain of such an exciting life, and after nearly a year of service he returned to Chicago, where he accepted, in 1874, the position of registrar in the University of Chicago. In this institution he almost immediately commenced teaching, first as Instructor in Botany, and two years later, in 1876, as Professor of Botany and Geology. In this same year he was chosen to lecture on botany in the Chicago College of Pharmacy, and for a short time conducted a class in analytical

chemistry, a fact which points to his broad knowledge of nearly all branches of science. Soon, however, he was assigned to the chair of Materia Medica and Botany. In 1878 he met a sad loss in the death of his wife, who left him one son, Edson S., only three months old.

In 1883 he resigned from the Chicago University in order to give his whole time to the College of Pharmacy, and in the same year he was married to Ellen Beardsley Reed.

During the next several years the world commenced to see some of the results of Professor Bastin's labors. He first established a botanical and microscopical laboratory, then issued, in 1887, his first book, the "Elements of Botany," which in 1889 appeared in a second edition, enlarged and entirely rewritten, under the title of "College Botany." It has been adopted by a large number of institutions not connected with pharmacy.

In 1890, after having resigned his position in the Chicago College of Pharmacy, Professor Bastin entered upon his duties as Professor of Botany and Materia Medica in the school of Pharmacy in Northwestern University. Here he organized his second botanical and microscopical laboratory, which was a model of completeness. In May, 1891, he was again left desolate by the loss of his wife, and in August, 1892, he was married to Abbie Beardsley, who, with two little daughters, survives him.

Up to this time Professor Bastin's writings had been largely confined to his text-books; but in 1892 several papers appeared in *The Apothecary* from his pen, viz.: "The Flora of the South Shore of Lake Michigan," and "Starches in Root Drugs." He also published contributions on "Plant Hairs," "Notes on Vegetable Histology," "Plant Crystals," and "Detection of Stem Admixtures in Root Drugs."

In the autumn of 1893, Professor Bastin was called to the chair of Botany and Materia Medica in the Philadelphia College of Pharmacy. This position gave him the opportunity to carry on the research work which it had long been his aim to do, and he entered upon his duties with an immense amount of enthusiasm. Notwithstanding the interruption and distraction necessarily accompanying the moving of his family to a new city, he had in one year established the third botanical and microscopical laboratory organized by him, he had conducted two large classes through a college year

of instruction, had published his important work, "Laboratory Exercises in Botany," containing several hundred illustrations from his own pen, and finally, he had made several contributions to the AMERICAN JOURNAL OF PHARMACY. The few succeeding years were no less active ones; during 1895 he published no less than nine illustrated papers on our local medicinal plants; one of these, "Veratrum Viride," contained a plate in colors, the original being from his brush. His research work during 1896 was devoted to the structure of the "North American Coniferæ." This series of papers was published in joint authorship with Henry Trimble, and was only partly completed at the time of Professor Bastin's death. All the drawings were from his pen. He was also engaged in preparing an elaborate work on materia medica, and he had mounted a great many sections of drugs for the purpose of making drawings from them. His inability to make rapid progress with this work was a great trial to him, and he persisted in it at intervals until March 18, 1897, when, after mounting two sections, he laid down his work forever.

Death came to his relief on April 6, 1897, the immediate cause being cerebral hemorrhage. He had not been well since the previous summer, but he continued to attend to all his teaching duties until the middle of December. What at first appeared to be nervous prostration, developed into exophthalmic goiter. His tremendous will-power kept him on his feet almost to the last, and as late as February he delivered one lecture, but it was like the last flaring up of a flickering light.

Professor Bastin was a member of several scientific societies, viz.: The Chicago Academy of Science, The Evolution Club, the Illinois Microscopical Society, The American Association for the Advancement of Science, and the Royal Microscopical Society of London. A short time before his death he was elected a member of the American Philosophical Society. He was also a member and trustee of the Philadelphia College of Pharmacy.

In studying the character of this man one cannot but be impressed with the wide range of experience he covered in 54 years, yet no one can say that he was not a master in every station in which he was placed. Whether as student, soldier, teacher, author or artist, he was a man, and a thoroughly honest one. His strict honesty with himself caused him to expect honesty in everyone else. An anecdote will best illustrate how binding he considered his own promise.

When he first came to Philadelphia he arranged for the publication of his book on Materia Medica, which was unfinished at the time of his death. It was afterwards shown very clearly to him that he could, with great advantage, give the publication to another firm, and he expressed his desire to do so but for his promise; and when asked: "Is there no way out of it?" the prompt reply was: "Yes, there is a way out of it, but there is no *honest* way out of it." It is almost unnecessary to add that the question of publication was considered settled from that time.

As a teacher, Professor Bastin was noted for his conscientious thoroughness; no amount of labor was too great for him to undertake in the interest of his students. He was an earnest advocate of the *practical* study of the natural sciences. When asked, during his preliminary visit to the College in 1893, if he would be willing to establish a laboratory for the practical study of materia medica and botany, his reply was that he would not be willing to undertake to teach those branches in any other way. In his "College Botany" are some introductory paragraphs, entitled, "A Word to the Student," a few sentences of which should be read and re-read by every one engaged, or about to engage, in the study of botany. He says:

**Remember that the study of botany is primarily the study of plants, and not the study of books about plants. If you study the book only, you will almost certainly find it dry and unprofitable, but if you use it as a guide to the study of plants, and study it PLANT IN HAND, verifying its descriptions by observations of your own, you will find the work not only profitable, but intensely interesting.**

These few sentences say more than whole volumes could be made to say against the entire race of "Quiz Compends," "Aids," "Lecture Notes," "Home Studies," and all the other "short cuts" which are devoured but not digested by the great army of unprepared applicants for State Board Certificates. Professor Bastin's method of studying botany was either in the field, or with the microscope, but always with the plant or drug in hand, and his method of imparting instruction was the same. It remains but to speak of his domestic life, which, by those who knew, has been declared to have been an ideal one. He was especially fortunate in his matrimonial alliances, which caused the losses to bear more heavily upon him. He brought into his family the enthusiasm which he himself possessed

for the study of nature, and thereby drew the members into sympathy with him and his busy life. His funeral was from his residence in Merchantville, N. J., and was largely attended by his students and college associates. The burial was in the beautiful and historic cemetery of Colestown, a few miles distant. H. T.

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## RESEARCHES IN REGARD TO THE VENOM OF THE HELODERMA SUSPECTUM, COPE.

From the Physiological Laboratory of the Caroline Institute, Stockholm, Sweden.

BY C. G. SANTESSON, Professor of Pharmacology.

Having had the opportunity to examine the saliva from three lizards of the above-named species, *Heloderma suspectum*, Cope, which were caught in Arizona and sent alive to the Zoological Institute at the Stockholm High School, and thinking that any new information in regard to this wonderful species of animals might possibly interest American readers, especially since the question of its poisonous nature has been enthusiastically discussed in American papers, I venture to submit for their perusal a short account [1] of the results of my experiments in this line.

Before beginning to relate the results of my own experiments, I must, however, call attention to several features in the discussion carried on in America, adding a few remarks of my own.

The fact that the anatomical structure of the heloderms suggests the probability of their being to a certain degree poisonous has been pointed out by Cope.[2] Numerous experiments made on animals by Sumichrast,[3] Boulenger,[4] J. Fayrer, in the *Zoological*

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[1] My studies on this subject have been more completely published in German in a treatise with the title: "Ueber das Gift von Heloderma suspectum Cope, einer giftigen Eidechse," No. 5 of the festival volumes of *Nordiskt Medicinskt Arkiv*, dedicated to Prof. Axel Key, March, 1897.

[2] Cope: *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1867, p. 5; see also a postscript to an article by Shufeldt, *The American Naturalist*, Vol. 16 (1882), p. 907.

[3] Cfr. letter to Bocourt: *Comp. rend. de l'acad. des sciences*, t. 80 (1875), p. 676; furthermore, Sumichrast: *Bulletin de la soc. zool. de France*, Vol. 5 (1880), p. 178.

[4] Boulenger: *Proceedings of the Zoological Society of London*, 1882, p. 631; gives an account of Fayrer's observations.

*Gardens*, London,[5] of Weir Mitchell and Reichert,[6] and Garman,[7] have shown that the secretion from the salivary glands of the heloderms is more or less venomous. Frogs, hens, doves, guinea-pigs and rabbits always died of it, the two last-named kinds of animals generally very quickly. Cats and dogs did not die, but showed *local effects* of the poison (pains, swelling, extravasations, etc.). Two experimenters are said to have arrived at entirely negative results, viz.: Irwin, U. S. A., about whose experiments (made in 1867?) I have no explicit knowledge, and Yarrow,[8] who discovered *no positive results worth mentioning, neither after bites nor after subcutaneous injections, the animals always recovering soon.*

In regard to this last-named research, I beg to call attention to the possibility for *individual* variations to exist in the venomous nature of the heloderms, some individuals always or periodically being in a much smaller degree venomous.

The accounts of the influence of heloderma bites on man are of the greatest interest, as for instance the misadventure of Shufeldt[9]. In spite of the severe pains, swelling, etc., after the bite, this investigator still regards the animal to be harmless, and points out the fact that even the bites of men or cats may sometimes have a poisonous effect, although neither men nor cats are classified among the specifically poisonous animals. It seems to me that Shufeldt here mixes up two quite different things; the bites of men or of cats can certainly not be said to be specifically poisonous (as for instance is the case with snake-bites); but, on the other hand, they may very easily cause bacterial infection or "blood-poisoning." The symptoms observed by Shufeldt much resemble those brought about by the bite of our common viper (*Vipera berus*), *i. e.*, they resemble a slight specific poisoning, but *not* "blood-poisoning." It may, besides, be pointed out that an animal is not "harmless" because it does not kill. The bite of our above-mentioned viper does not, as a rule, kill grown-up persons, and still everybody looks upon it as a specifically venomous animal, and so it is, beyond all question.

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[5] Short notice in the *American Naturalist*, Vol. 16 (1882), p. 842.

[6] Weir Mitchell and Reichert: *The Medical News*, Vol. 42, No. 8, Feb. 24, 1883, pp. 209–212.

[7] Garman: *Bulletin of the Essex Institute*, Salem, Mass., Vol. 22 (1890), pp. 60–69.

[8] Yarrow: *Forest and Stream*, New York, June 14, 1888, p. 412 and suc.

[9] Shufeldt: *The American Naturalist*, Vol. 16 (1882), p. 907 and suc.

There is another account of a person bitten by a heloderma, which is perhaps not so well known by our American readers. Mr. J. Stein, of Mexico, who once sent two heloderms to Fischer for anatomical and histological examination of their poison apparatus,[10] was on one occasion deeply bitten in a finger by one of them. *The finger and the whole arm swelled up considerably, causing the most violent pain, and his general condition was greatly disturbed.* For a long time afterwards the skin of the arm had a yellow, parchment-like appearance. Short as it is, this description of the specific local effect of a poison could scarcely be clearer. In accounts of death as a consequence of heloderma bites, it may, perhaps, not be worth while to place too great confidence.

Even the experience hitherto gained seems decidedly to show that the heloderms are specifically venomous, although their bites are less dangerous than those of poisonous serpents, and generally not fatal to men.

The heloderma on whose venom I have made the most of my experiments (from October, 1895, till February, 1896) was a female *H. suspectum* (Cope), 40 centimeters long, in good health. It could not be induced to bite animals, *was sluggish and good-natured. The venom was gained in the following manner:* With a pair of long, crooked tongs, I took a clean, dry sponge, about as large as a walnut, and forced the animal to bite it. When I had sufficiently irritated the reluctant animal, it would seize the sponge, and I then generally succeeded in pressing it into the animal's mouth. The venom in the sponge was then drawn out by means of a little quantity of 0·6 per cent. solution of common culinary salt. The fluid thus obtained was turbid, slimy, slightly alkaline, having an aromatic smell not at all unpleasant. Some simple preliminary tests showed that the fluid contained *protein substances;* these could almost completely be precipitated by alcohol in excess, the fluid having first been rendered slightly sour by the addition of acetic acid. If, after thus having acidified it, the fluid was instead boiled for a short time, a part of the albumen coagulated, while the rest remained in solution.

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[10] J. G. Fischer: "Anatomische Notizen Ueber *Heloderma horridum* (Wiegm)." *Verhandl. d. Verens f. naturwissensch.* Unterhaltung zu Hamburg, 1883, pp. 2-16.

The poisonous liquid drawn out of the sponge by means of the weak solution of salt was afterwards subcutaneously injected into frogs, white mice and rabbits, *which all died of it.* By special experiments, I convinced myself that there was no other poison in the sponge, syringe, canula, etc. *The common symptom was a paralyzation of the nervous system,* setting in gradually after a short lapse of time and ultimately causing death. Convulsions were not observed in rats, and in rabbits only in a very slight degree towards the end (suffocating convulsions slightly indicated). In frogs the poisoning lasted from 57 minutes to several hours, a day and a night, etc.; in rats 56 to 85 minutes; a little rabbit lived 112 minutes. The frogs died of paralyzation of the heart;[11] the animals, on the contrary, seemed to die of the gradual paralyzation of the nervous system and the centres of respiration. If, on prolonged irritation of these latter systems, the heart had been primarily paralyzed, signs of acute inner suffocation, accompanied by dyspnœa and violent convulsions should have appeared, as was the case in the experiments of Weir Mitchell and Reichert (see note 6); but such was not the case to any degree worth mentioning. The difference between the results of these investigators and my own surely depend chiefly on their having, as a rule, used much greater doses than I did; they have, therefore, obtained a sudden paralyzation of the heart, while my experiments have brought about very gradual paralyzation of the nervous system.

On account of the way in which I collected the poison, I cannot say how great the doses were. The quantity of saliva taken amounted on one occasion to about 0·3 gramme, but surely both the quantity and the toxicity varied much on different occasions. That the poison is effective in very small quantities was proved by the following experiment: 1·8 milligrammes of dried poison was dispersed in a little water, only partly dissolved; was filtered and injected into a frog. The animal grew very weak and languid, but was, however, not totally paralyzed; did not completely recover until after a week. The *poisonous* part of this dose was certainly not more than a fraction of 1 milligramme.

A more minute examination of the development of the paralysis

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[11] Frogs can, as a rule, hardly die from paralyzation of the respiratory organs, since they breathe so sufficiently through their skin that they can lie alive for weeks without lung respiration and afterwards recover.

in frogs showed that the central nervous system, the brain and the spinal cord were first affected by it, but afterwards it also attacked the termini of the motor-nerves in the muscles, producing a complete *curare effect*, while the irritability of the muscular tissues remained unaffected.

In the *heart of a frog* observed *in situ* without opening the thorax, the rate of pulsation after subcutaneous injection of the poison was observed at first to increase a little, then gradually to decrease until it stopped entirely. Shortly after the heart had stopped, or while the auricles were still beating slightly, the ventricle (after opening the thorax) usually seemed contracted and stiff, surely indicating a direct effect of the poison on the muscular tissues.

Weir Mitchell and Reichert have not observed any *local effect* of the heloderma venom. Probably this depended upon the hasty death of the animals on whom they experimented. In several experiments on frogs, I have discovered œdema, small extravasations, discoloring and fragility of the muscular tissues, etc., at the place of injection (mostly in the walls of the lymph-sinus of the thorax and abdomen). In a rat I once observed a greenish-brown discoloring of the tissue around the place of injection. Furthermore, in many accounts of former experiments on animals, and also in accounts of cases in which people have been bitten (Shufeldt, Stein), we read of more or less marked local effects of the poison. Local *gangrene* is, however, not mentioned, and, as a rule, the local effects have soon disappeared.

On mucous membranes (the mucous membrane of the stomach and the conjunctiva) the heloderma poison does not seem to have any injurious effect.

By means of some special experiments, I have furthermore tried to discover how the poisonous part of the helederm saliva is affected by *alcohol* and *boiling*. If to the poisonous fluid, which has been rendered a trifle sour by the admixture of acetic acid, alcohol is added in excess, *all* the poison may be precipitated, in case the process is carefully carried out. If the alcohol is then filtered off from the poison and allowed to evaporate, and if the residues, after the evaporation of the alcohol are dispersed in acid water, the liquid thus obtained is uneffective. Thus, *poisonous alkaloid substances*, which ought to have dissolved in alcohol and then in acid water, *were not to be found*.

The alcoholic precipitate was again partly dissolved in water (after the alcohol had been removed), and this solution *always* had a fatal effect, accompanied by the usual symptoms, sometimes so suddenly (a frog died in fifty-seven minutes) that there is all reason to suppose that the *whole* of the poison had again been dissolved. From this the important conclusion may be drawn that the poison probably *does not*, or at least only to a small degree, *belong to the group of common albuminous* substances (*albumin, globulin*), which soon become so altered in alcohol that they cannot be again dissolved in water. On the contrary, the venomous principle ought, probably, to be looked for among the nuclein substances, the albumoses (albuminoses?), the peptons, the mucoid substances, etc.

If the poisonous liquid rendered slightly sour by acetic acid *is boiled*, coagula are formed, as before mentioned. These are not poisonous if well washed with water; but if not washed, a more or less considerable amount of the venom is liable to adhere to them, and this venom may afterwards be soaked out of the coagula, and it is then even able to cause fatal poisoning. That which is coagulated by boiling and is insoluble in water probably consists of common, harmless albumen. Thus it may be seen that the poison, when boiled with acid, remains in solution. On the contrary, with alcohol it may be precipitated from this solution, but may again be dissolved in water. These circumstances also point out that the venom is not an albumin or a globulin, but belongs to the latter of the above-named groups of protein substances. The fact that the poison is not destroyed by boiling shows that it *is not an enzym* (*an unorganized ferment*), as these are usually conceived.

When the poisonous solution is brought into a slightly sour reaction by means of a *small quantity* of acetic acid, there is no precipitation. Consequently, *true mucine is not present in any great quantity*.

Since the supply of material which I was able to obtain was very small, it was rather difficult to determine the *chemical nature of the venomous substance or substances*. I therefore applied to my colleague, K. A. H. Mörner, Professor of Medical Chemistry in Stockholm, who had the kindness to undertake this work, while I myself made the experiments on animals required for these tests.

The poisonous solution, rendered a little sour by acetic acid, was precipitated by alcohol in excess; this precipitate was dissolved in

water and was again precipitated by acetic acid and brought to a tolerably strong sour reaction. In this precipitate there was found phosphorus, organically bound; here there was, therefore, undoubtedly, some *nucleiniferous protein substance* present.

But was this substance poisonous? From another quantity of the poisonous secretion, the nuclein substance was again isolated, dissolved in water with a little soda, and injected into a frog. The animal soon grew weak, bled continually, though slowly, from a small wound on one of its lips, and died after three days. On dissection, I found a great number of small extravasations of blood in the muscles of the thorax and even some in other places. We see here (at least partially) the characteristic effects of nuclein substances on the blood (diminished coagulating power, extravasations). If a stage of increased coagulating power had preceded, I do not know. If the solution of heloderm poison is directly applied to defibrinized blood (of a rabbit), the blood-corpuscles seem to take a spherical form, which reminds us of the effect of the *snake-poison globulines*[12] of Weir Mitchell and Reichert.

The solution from which the above-named poisonous nuclein substance was removed by precipitation with acetic acid did not contain any albumin which coagulated on boiling. On the other hand, Millon's reaction showed the presence of some protein substance. With sulphate of ammonium in substance, a considerable downy precipitate of *albumoses* was obtained. After these had been filtered off, the liquid (the filtrate) gave no "*biuret-reaction;*" consequently *true peptons were not present.* In the liquid from which the nuclein substances had been removed, albumoses could still be displayed by means of ordinary culinary salt and acetic acid; these called forth a turbidness which disappeared on boiling and reappeared when exposed to cold.

From another sample, the *albumoses* were isolated in the above-described manner with neutral sulphate of ammonium in substance, were then separated as much as possible from the ammonium salt, were dissolved in water and precipitated with alcohol. The latter treatment was repeated once more, and at last the new alcohol precipitate was dissolved again in water. This solution of albumoses, which still contained some sulphate of ammonium, was injected into

[12] Weir Mitchell and Reichert: "Researches upon the Venom of Poisonous Serpents," Washington, 1886.

a frog. The frog soon grew weak, almost paralyzed, but did not die. On the contrary, it gradually recovered, but after ten days was not yet quite normal. It was then killed; no extravasations were visible. (With a larger dose of sulphate of ammonium injected into another frog, it was shown that this salt called forth quite different symptoms.)

From the experiments here related, it may be seen that *the principal venomous elements of the heloderm saliva consist partly of nucleiniferous substances and partly of albumoses.*

By special experiments it was at last shown that *aqueous extract from the poisonous glands of the heloderma and the blood of that animal* possessed poisonous qualities.

Consequently, my observations most decidedly support the assertion of the majority of experimenters, especially Weir Mitchell and Reichert, that the *heloderms are specifically poisonous animals*, even if, as a rule, they are not aggressive towards men, and, on account of their sluggishness, only seldom do any harm. A heloderma is, at all events, an individual to be suspected, even if it does give but very little reason for the name "horridum." As a playmate for children (Cfr. Weir Mitchell and Reichert, note 6), it is certainly not suitable.

STOCKHOLM, June, 1897.

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## THE PHARMACIST AND THE MICROSCOPE.[1]

BY HENRY KRAEMER.

The topic of "The Microscope in Pharmacy" is by no means a new one. In this country for at least the past twenty years it has been a theme upon which comparatively many have written. Upon looking over some of these papers one is struck with the loyalty of the authors to the microscope, in describing its construction, uses and even possibilities. Nevertheless, one cannot but feel that the situation has been viewed in most cases from some other standpoint rather than the practice of the profession of pharmacy. The idea that seems to pervade the atmosphere is that all that is necessary for the pharmacist is to procure the necessary apparatus (microscopes, reagents, etc.) and books and to follow the directions given. One furthermore receives the impression that, because

[1] Presented at the New York State Pharm. Assoc., July 13, 1897.

vegetable drugs possess characteristic structures, therefore, the pharmacist ought to use his microscope in determining all of the drugs that he buys. The result of this kind of writing has, to some extent, hindered our progress in practical pharmacognosy in this country.

ONE MUST BE TAUGHT.

To possess a microscope and not know how to use it, or to think one knows how to use it, and spend one's time by one's self in endeavoring to interpret what is revealed there, is both money and time wasted. In order to obtain results that are reliable in using a microscope for any purpose, one must know how to use the instrument and understand the structures in the department (say botany) where it is to be used. This necessary knowledge can come only by being instructed properly. Of all the instruments yet devised in the prosecution of scientific research, there is none that requires that its user shall be better taught in the foundation and guiding principles of the science in which he engages, than the microscope. It is extremely unprofitable for any one to have the idea that he can teach himself the use of the microscope in the science in which he proposes to apply it. It looks very inviting to see a good illustration and to read of sectioning, mounting and examining a drug with the microscope. It is another thing to do the work and see the points. Experience teaches us that a beginner finds no help in the illustrations of books. What the beginner needs in doing microscopical work are not illustrations or facts, but ability to use his hand, eye and brain rightly. *One must be taught, i. e., guided to knowledge.* Time must first be consumed under a competent teacher in mastering the construction of the instrument and in becoming familiar with the methods of doing microscopical work and in learning the foundation and guiding principles of morphology (both outer and inner) of the plant kingdom. After this is accomplished the student will find books helpful. Now he can use his hands properly, see with his eyes correctly and interpret with his brain rationally. The more knowledge that is gained by personal observation the stronger and more self-reliant will the student become.

A broad botanical or even biological university training is the best foundation and is necessary to accomplish the best work with the microscope. It cannot be said, however, that this is absolutely

necessary in the prosecution of the microscopical work by the pharmacist. It is necessary for him, however, to have mastered the foundation principles of physics, botany and chemistry in order to get the results that are of practical value to him. Some of our schools and colleges of pharmacy are now prepared to give their students a good start in this direction. The student must not be dismayed, but, on the contrary, expect "to make haste slowly" at first. He must exercise patience in learning to section drugs and work persistently under a competent instructor until he understands the principles of his subject. Nature does not unfold herself unless you work patiently and incessantly at her. When one problem is well worked out, the next is easier, so that by the time the student is master of his subject, results come comparatively easily.

### TIME AND PLACE FOR USE OF THE MICROSCOPE.

Having shown that instruction is necessary in order to secure reliable results from the use of the microscope in pharmacy, the illusion that the microscope is necessary on all occasions must be dispelled. While it is an indispensable instrument sometimes, it does not follow that it must be used always, any more than because an axe is used to chop down a large tree, that therefore an axe is necessary to break up every piece of wood. The microscope has its time and its place for use by every one who is accustomed to using it in his special line of work. It is as superfluous for the educated pharmacist to use his microscope in the examination of each lot of nux vomica or calumbo that he buys as it would be for the field botanist to require to make a microscopical examination before he could determine, say, Castanea dentata or Quercus alba. In fact, it bespeaks lack of knowledge in the botanist. It likewise reflects on the professional pharmacist who wishes to make sections of those drugs which are so characteristic in a crude condition, and which by experience he ought to distinguish at once. The microscope is to be employed only when more refined tests are necessary.

### APPLICATIONS OF THE MICROSCOPE IN PHARMACY.

Upon the completion of a proper laboratory course, and being well grounded in the various sciences necessary for the use of the microscope in pharmacy, we must also recognize that in the use of the microscope there is a training of the eye (a sharpening of it, so to speak), so that the trained eye, with the other senses (educated

too), are all to be employed where necessary in determination of drugs. Now, there are times when the use of the microscope alone is essential, whereas at other times it is rather a convenience in the practice of pharmacy. Some of the applications of the microscope in pharmacy are the following:

(1) *Examination of Some Crude Drugs.*—While appearance, odor, taste, etc., are generally sufficient aids in determining most of the commercial crude drugs one from another, still there are instances where a microscopical examination is desirable and necessary. This is especially so when certain drugs occur in relatively small pieces, or when two or more drugs that possess similar characteristics are supposed to be intermixed or incorrectly labelled. The microscopic structure will generally enable one to quickly dispose of such doubtful cases. The following crude drugs of the U.S.P. require not infrequently a microscopical examination for their accurate determination, especially when they do not appear in the forms usually seen in commerce:

Mexican sarsaparilla from Honduras sarsaparilla.
Belladonnæ radix (the horny kind) from Inula.
Belladonna folia from Stramonii folia.
Serpentaria,[1] from Spigelia.
Granatum from Xanthoxylum.

There are a few cases in the examination of crude drugs where microscopical examinations have been advocated, and while sometimes necessary, the quality and nature of adulterant may frequently be told by the eye alone, as Crocus, etc.

(2) *Examination of Powdered Drugs.*—In recent years powdered drugs have been introduced to such an extent that in many retail pharmacies few crude drugs are to be found. Drugs in the powdered condition may be obtained pure, but adulteration is more easily effected. The reason for this is owing to the inability of the average pharmacist in detecting it. We notice that some State Boards in their examinations give the candidates very few, if any, crude drugs for determination. In time there can be no doubt but that the candidates for the State Board examinations will be required to identify powdered drugs and pronounce on their quality. This is desirable for the sake of the profession of pharmacy, and in accord

[1] The microscope is not necessary here, as will be shown in an article to be published later.

with the spirit of the State Boards in giving the candidates as practical examinations as may be possible. The microscope must, in this province, be used, as only by means of it can one determine most of the powdered drugs and pronounce on the quality of all. By means of the microscope, drugs of different origin may readily be determined, as the various sarsaparillas, sennas, ipecacs, etc.

(3) *As a Preliminary Step in the Study of Plant Constituents.*—The microscope is of undoubted service as a preliminary step in conducting chemical examinations of drugs. The nature of inorganic substances (as $CaCO_3$, $CaC_2O_4$, $SiO_2$, etc.) may readily be detected. The nature of some carbon compounds (as starch, sugar), and active principles (as oils, resins, tannins or other substances) may be detected qualitatively.

(4) *In Determining the Relative Value of Drugs.*—It not infrequently happens that two drugs of different origin or habitat are used in medicine, and that the cheaper contains the larger percentage of active principles. A chemical assay may be resorted to; but when purchasing a small quantity of a drug this might not pay. By means of the microscope, however, an approximate comparison may be instituted, even quantitative results may be obtained, as has already been shown, and will be further demonstrated in a forthcoming paper. This applies not only to powdered, but also to crude drugs. The following instances may be cited:

(*a*) *Gingers.*—The African ginger is cheaper than the Jamaica ginger, but the former contains more secretion cells, which are about the same size in both. Hence, the African, though cheapest, assays a higher percentage of oleoresin.

(*b*) *Buchus.*—The short buchu is cheaper than the long buchu, but resembles the former, and contains much larger and more numerous secretion reservoirs than the latter; hence the "short buchu" assays more oil than the other.

(5) *In Determining Loss of Active Principles.*—It is possible in some cases, without resorting to a chemical assay, to determine whether the active principles have been removed. This is notably so in drugs that contain alkaloids, secretion reservoirs or secreting hairs, as cinchona, ginger, cloves, or any labiatæ.

(6) *In Determining Identity and Quality of Spices and Foods.*—Since the introduction of spices in a powdered condition into the household there has been the most flagrant kind of adulteration

practised. In many cases the microscope is the only satisfactory means for determining the purity and nature of adulterant.

A few illustrations may be given:

(*a*) *Pepper* is adulterated with mustard hulls, wheat flour, etc.

(*b*) *Bermuda Arrowroot* with other arrowroots and starches.

(*c*) *Tea* with the leaves of Salix alba, Sambucus nigra, etc.

(7) *In Determining Unknown Drugs.*—It often occurs that a pharmacist receives for identification samples of drugs that are unknown to him. It may be that they are common indeed and indigenous to this country. The microscopic examination at once gives one a start. The compound microscope is, indeed, playing a very important part to-day throughout systematic botany. Certain groups or families or genera are found to possess a certain characteristic inner morphology, and this is the key to the solution. It may be that the arrangement of the elements of the fibro-vascular bundle is peculiar, or that the shape of the element (root, stem, etc.) is characteristic, or the identification may be based on the nature of secretion cells, or form and nature of hairs, etc. In leaves the habitat may sometimes be determined by reason of the structure.

(8) *In Biological and Sanitary Analysis.*—The advancing pharmacist is taking upon himself the study of these branches, which are more or less directly related to medicine, and for which there is evidently a growing demand. He is making the biological as well as chemical analysis of water and reporting on the condition of sputum, urine, etc., of the patients of the physician. In all this kind of work the microscope is necessary.

(9) *For Other Practical Purposes.*—Recently some one wished to examine the number of meshes in some sieves. The compound microscope was recommended for the purpose, the principle of the method followed being the same as that used in measuring the lengths of cells, etc.

The microscope may be used in detecting forgery, in determining the writing on soiled labels; also in ascertaining the kind of writing paper, labels, etc., that are purchased, etc.

### THE INFLUENCE OF THE USE OF THE MICROSCOPE.

From what has preceded it is seen that the microscope has a very important bearing on the practical work of the pharmacist. It would not be proper in an essay of this kind to fail to record the

influence of the microscope in the training of the pharmacist. The use of the microscope does for him—as it does for all—an infinite amount of good that must not be overlooked. It makes better observers of all. The early workers with the microscope often remarked that it enabled *the worker to see with the naked eye afterwards structures that were invisible to him before he used the instrument.* By means of the simple lens one is enabled frequently to make out those characteristics of a drug that he has seen with the compound microscope. Finally, with the naked eye alone, one can, by experience, obtain results in determining the quality of drugs that are based on structure and not on ephemeral external characters.

RESULTS OF THE USE OF THE MICROSCOPE.

We must not be discouraged by reason of the sceptic and his oft-repeated question: "What is the use?" The sceptic is as useful in treating this subject as he is in other problems. In the applied sciences this question is ever before the student. The pure scientist, in his pure science, need pay no attention to the query. But the business and professional man feels it necessary to devote his energies to those things only that will bring forth useful fruits. There is, however, an insurmountable difficulty in following the applied sciences; one cannot predict what scientific fact or discovery will be the basis or part of a principle in the construction of some useful invention. Hence we find it necessary to take in more than we can use practically, and are silenced for the time sometimes by the question: "What is the use?" Nevertheless, we are safe in recording some of the results that accrue to the educated pharmacist from his use of the microscope. The benefits are two-fold, viz.: to the pharmacist and to the public.

(1) *To the Pharmacist.*—The pharmacist is able to dispense drugs, foods and spices, the purity of which he can guarantee. This means to him and for him:

(*a*) The most efficient of co-operative work with the physician.

(*b*) The building up of a good pharmacy, the name of which shall endure.

(*c*) The establishment of confidence in him by the best physicians and the public. To have a good custom one must sell good drugs.

(*d*) The pharmacist receives the value of his money for his purchases. He does not pay a high price for an inferior drug, as a Honduras price for a Mexican or other sarsaparilla.

(*e*) The conscience of the pharmacist is clear, as he knows what he is selling.

(*f*) It is also an advertisement to the pharmacist, and he may judiciously utilize it in the building up of his estate here.

(2) *To the Public.*—The public receive in return pure drugs, foods and spices. This means to them :

(*a*) Confidence in the pharmacist, which sometimes may prolong and even save life.

(*b*) Satisfaction in the goods for the money paid.

ARGUMENTS AGAINST THE USE OF THE MICROSCOPE.

(1) It requires an educated person to use the microscope to any advantage. A mere merchant could not use it with profit. It requires that one shall have spent time and money in acquiring a proper education. Hence, they who have never been instructed by a competent teacher cannot practically avail themselves of the benefits of the use of the microscope.

(2) The cost of the outfit, being at least $25, makes some persons, who might use it profitably, think too long about purchasing a microscope.

(3) Time must be given to the use of the microscope. Many pharmacists feel that if there is any time to spare it ought to be given to "resting up" or waiting for the next rush of business.

(4) It takes "nerve" or backbone for one to go to college, to buy a microscope, to give the time that is necessary for securing results and to believe that all will pay in the end.

(5) The merchant who wishes to purchase his goods at the lowest price, regardless of quality, does not care to be able to know whether the guarantee of the seller for purity is correct. He would rather sell impure and adulterated goods with the clear conscience of wilful ignorance.

CONCLUSION.

A good education is necessary for a professional pharmacist, and he alone who is taught properly can use the microscope advantageously.

The microscope may be utilized in so many practical ways by the

educated pharmacist that the receipts far outweigh the cost and time. The light in the sky is already appearing, the clouds are rising higher and higher on the mountain side, and the practical pharmacists are ascending one by one to higher flights than where they rested yesterday, and they follow those who it sometimes may seem are working in the clouds, yet who, nevertheless, when the light shines, are seen to be laboring for the benefit and the future of pharmacy.

## THE TANNIN OF CASTANOPSIS.

By Henry Trimble.

In the June number of this Journal, p. 296, attention was called to the presence of strontium in the bark of several species of castanopsis received from Dr. H. N. Ridley, of the Singapore Botanical Gardens, India. These barks have also been examined for tannin; and the results are now tabulated along with those from two species of oak also from Singapore, and two samples of the one species of our native castanopsis, C. chrysophylla. The results on one sample of the latter were published in the *Garden and Forest*, **8**, 293, July 24, 1895; the editor, Professor C. S. Sargent, adding some remarks concerning the genus, which, by reproduction here, will throw additional light on the subject.

As is well known, the bark of Quercus densiflora, of California, is popularly considered the most valuable tanning material produced in the Pacific States of North America. This oak is the only American representative of a peculiar group of trees which inhabit southeastern Asia. and are intermediate in botanical characters between the true oaks and the chestnuts.

There is another genus, Castanopsis, which is also intermediate between the oaks and the chestnuts, and also of southeastern Asia, but, curiously enough, with a single representative in Oregon and California, Castanopsis chrysophylla, a very beautiful tree, which the Californians call the gold-leafed chestnut, from the bright golden scurf which covers the lower surface of the leaves. Some botanists treat Castanopsis as a section of Castanea, while others, like Dr. King, of Calcutta, who made a special study of the genus, although finding no very good characters by which it can be distinguished from one of the Asiatic sections of Quercus, maintain the genus for the purposes of convenience. The relationship of this tree to Quercus densiflora on one hand, and to the chestnut on the other, suggested that its wood and bark might contain valuable tanning properties.

The result of a comparison of the American Quercus and Castanopsis, was to show that the tannin of Castanopsis chrysophylla is

identical with that from Quercus densiflora, and, therefore, with all the other species of oak which have hitherto been examined by me. Since chestnut tannin is identical with gall tannin, and that from the oak is quite a different substance, the result from a chemical standpoint, placed the Castanopsis chrysophylla with quercus.

The natural sequence of this investigation was a desire to examine the several species of castanopsis of India, where all the other members of the genus grow, and through the kindness of Dr. Ridley this has been possible. It is to be regretted, however, that only the percentage amount of tannin and some general characters can be given at this time, since there was not sufficient material to admit of a final decision in regard to the composition of the tannin. The attempt was made to purify two lots of tannin from these barks, but it is only safe at present to state that the indications point to the presence of oak tannin in all the Indian species. An additional liberal supply of the bark from the American species was also received from Miss Alice Eastwood, of the California Academy of Science, collected by Dr. Geo. McCowen, Ukiah, California.

| | Moisture. | Ash in absolutely dry sample. | Tannin in absolutely dry sample. |
|---|---|---|---|
| Castanopsis Wallichiana . . . | 8·94 | 4·40 | 5·37 |
| " Curtisii (old tree)[1] . | 8·53 | 2·03 | 16·07 |
| " " (young tree)[2] | 6·81 | 4·41 | 7·21 |
| " Javanica . . . . . | 6·93 | 4·61 | 8·06 |
| " Hullettii . . . . . | 6·51 | 3·77 | 6·73 |
| Quercus hystrix . . . . . . . | 7·00 | 6·20 | 8·60 |
| " discocarpa . . . . . . | 7·27 | 3·93 | 5·28 |
| Castanopsis chrysophylla . . . | 42·72 | 3·70 | 18·92 |
| " " . . | 10·43 | 0·61 | 8·58 |
| Quercus densiflora . . . . . | 10·31 | 2·46 | 16·12 |

[1] Collected in Penang.
[2] " " Singapore.

The two specimens of Castanopsis chrysophylla were quite different in character; the one showing the large percentage of moisture was

taken from a shrub, and was received while in the moist green state, a condition favorable to a large yield of tannin; the other was apparently from a much older tree, and apparently much of the tannin was changed to an insoluble red coloring. The low ash cannot be accounted for.

In connection with this the following description of the Indian species by Dr. Ridley may be of interest.

Castanopsis Wallichiana. Nuts commonly eaten. If there are not two species mixed under this name, the leaves are very variable.

C. Curtisii, King. Native name, "Berangan Janthong." One from the type tree in Penang, marked "old tree," the other marked "young tree," brought by a native collection from our forests here; though the collector persists it is Curtisii, I have never myself seen this species in Singapore.

C. Javanica, King. Native name, "Berangan Gajah." I think two species may have been placed under this name by Dr. King. The fruits of the sample sent are very large; nuts single, oblong, about three inches in length; they are purgative when eaten.

C. Hullettii, King. Native name "Berangan Papan, *i. e.*, plank chestnut. A big tree, nuts bitter, not eaten.

Quercus hystrix. Native name, "Mempening." A very common oak in Singapore.

Q. discocarpa, from Penang. I hardly see why this is not a Castanopsis; the fruit is just that of one.

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## RÉSUMÉ OF RECURRENT TOPICS.

By William B. Thompson.

*The Gradations of Chemistry.*—In the classification of the various branches of this science (and the divisions are very numerous, as well as comprehensive), it will be observed that some attach naturally to therapy and others to that of pharmacy. In a general sense we may say that the physician who fails to give full consideration to biological and physiological chemistry cannot be correct at diagnosis. Whilst, on the other hand, the pharmacist who omits to comprehend the relations of toxicological and pharmaceutical chemistry cannot proceed intelligently in applying knowledge to his art. A pharmacist appreciating the aids to the pursuit of his business could wisely adopt as a special study one of the many divisions of chemical science. Practice in this might, in time, be made remunerative. Apart from the utility, it is a most enticing and absorbing theme, and furnishes the key which unlocks some of the most profound and amazing mysteries of the material world. A taste of

this knowledge begets a thirst for more. Chemistry might be selected by choice and made an auxiliary to business, and to business titles, a deserved or earned title being more worthy than an assumed one. Once rescued from the commercial slough by the absorption of its numerous allied sciences, pharmacy ought to rise again to its true sphere and mission.

*Herbs and Simples.*—In the earlier days of medical and domestic practice, when vegetable substances were chiefly in vogue as remedies, there was quite an original subdivision according to their properties—suggestive, sensible properties. For instance, there were the so-called five great aperitive roots—smallage, or celery; fennel, parsley, petty-whin, and asparagus—the title aperitive having the same derivation as our modern word aperient, the latter being considered more in euphony. Then there were the *four* lesser *cold seeds*—succory, or chicory; lettuce, purslane, etc.,—and the four lesser *hot seeds*—celery, parsley, bishop weed and wild carrots. Next, the four greater *cold seeds*, of which the pumpkin is a type, and the four greater *hot seeds*, and so on. It will be noticed that these distinctions were not medical in any sense, but based on the plainest descriptions, hot and cold, our present pungent carminatives constituting the former, and the mucilaginous and saccharine the latter. Many of these were in established repute, and the observations upon their properties are so specific as to convince us that the effects were based upon absolute demonstration. With a large class of persons there yet lingers a strong predilection in favor of vegetable medicines. If we except the tonic varieties, their reasonable use can never be harmful. Can we say as much for the minerals? We cannot, however, revive the faith that once existed, and these substances are now the drug-store stock of indefinite age, and often indistinguishable.

*Artificial Peptic Action on Food Substances.*—That food may be partially digested, or pre-digested or peptonized by artificial process, and yet preserve such elementary state or condition as adapts it to the needs of the human body, is an open and debatable question. If the primary digestion only produces so-called peptones, and *true* peptones (which have never been isolated or identity established) are inseparable from the acting function of the human stomach or the animal chemistry of food-conversion, then we are somewhat at sea without a chart, for we cannot produce peptones arti-

ficially. It is quite a simple process to cause the animal ferments in certain favorable media, and, under the influence of heat, to act upon substance, and also to change the molecular or physical character of such substance; but it is a wide stretch of assertion to say that this altered condition is an exactly similar result to that change which food undergoes in the animal alimentary receptacle. This subject is, perhaps, more of a physiological than of pharmaceutical import; but as articles which come under this category are offered to the public for self-use and adoption, the knowledge of the apothecary is often sought in explanation of many things the lay community do not understand. It never meets the question of scientific adaptation, to merely say, "Oh, such articles are popular and sell largely." We all know how popularity may be secured through the free medium of printers' ink. If there is that which should be or can be understood, let us have the true knowledge to either guide our judgment or correct our errors.

*Chemistry as Applied to Industrial Arts.*—The thought occurs that, when knowledge in special branches of science becomes an application to industrial pursuit to art and to trade, there should arise, in this country, a national spirit to foster and encourage technical education in these arts, etc., etc. Take the production of chemicals of the synthetical class, for instance, as an applied industry, and also consider the science with non-general adaptations. There must exist a constant need of educated knowledge and skill in the departments of work and labor. This want is likely to increase by natural growth, but could be vastly extended by a systematic encouragement. The pharmaceutical student who imbibes a taste for, and inclination to pursue the study of this fundamental rather than collateral branch of science, and to make of it a special vocation, has very meagre stimulus here. How can we avoid seeking the necessary aid of foreign talent when we have, comparatively at least, none of our own? We have never promoted enlarged and liberal views on this and many other subjects of national economic importance. The student in chemistry, out of his novitiate, seeking to apply his knowledge, finds but limited opportunity open, and he must search and hope with discouraging result. A self-constituted committee of patrons, or patronage composed of manufacturers and others whose capital is embarked in the application of chemical science, either wholly or partially to the operations of industrial

arts and trades, or those who regard the aid of this special science, should ally themselves in some movement or purpose having the education of the American youth in view. Beyond the pale of commerce there is indeed very little conception of the vast inroad which German manufacturing chemists have made upon our industries. We are paying a very expensive tribute to their foresight in fostering a talent among their own people, which we neglect or overlook in ours. We are paying large annual sums to foreign firms and corporations for products which we can, and should make. In no region are crude materials so abundant as in our own country. A utility of these would add to *our* national wealth—give employment to our educated labor—instead of contributing to foreign capital. We need, now, urgently, every possible advance of occupation availed of in this country; our hands stand ready reaching for employment. In this also, we have involved a most serious social problem, a growing condition which will require adjustment in the not distant future, when it may require more wisdom to adjust than the present need demands.

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## THE NORMAL URINE.[1]

BY CHARLES PLATT.

The various compilations current as "Text-books of Urine Analysis" differ materially in their statements as to the average composition of a normal urine. In many cases, indeed, the authors have not even attempted to reconcile their "totals" with the figures given for individual constituents; but aside from this, which is, of course, the result of carelessness on the part of the compiler, we find great variations in the original figures, due not so much to errors of determination as to failure to secure representative samples for analysis. Normals determined for one nationality, or for one class of one nationality, are commonly applied indiscriminately to all without regard to fundamental differences in conditions. For instance, the average American's habit of life is not that of the German student, and yet it is a fact that the majority of figures given in our text-books have originated with the observations of German professors, working in conjunction with their student assistants.

In view of this laxity in text-book statement, the writer has for

[1] *Jour. Amer. Chem. Soc.*, 19, 382.

several years made careful records of all urine analyses with due attention to the age, sex and health of the individuals supplying the samples, and these figures (in all cases compared with and in some cases averaged with those of foreign observers) are now given in the following table:[2]

THE NORMAL URINE.

Color . . . . . . . . . . . . . . Pale amber, straw-yellow.
Appearance . . . . . . . . . Clear or with faint cloud of mucus.
Odor . . . . . . . . . . . . . . "Aromatic."
Reaction . . . . . . . . . . . Acid. Acidity in 24 hours equivalent to 2-4 grammes oxalic acid.
Specific gravity at 15° C. . . Range for adults, 1·015–1·025. Averages: Man, 1·020; Woman, 1·018.
Quantity . . . . . . . . . . 1100–1600 c.c. in 24 hours. Averages: Man, 1450 c.c. (22 c.c. per kilo of body-weight); woman, 1250 cc.

| | | *Averages for adults.* | | |
|---|---|---|---|---|
| | | *Man.* | | *Woman.* |
| | *Normal urine. Grammes.* | *Grammes urine in 24 hrs.* | *Grammes per kilo-gramme of body-weight.* | *Grammes urine in 24 hrs.* |
| Total solids | 45·0 –65·0 | 60·0 | 0·91 | 51·0 |
| Urea | 20·0 –50·0 | 34·0 | 0·51 | 30·0 |
| Uric acid | 0·3 – 0·8 | 0·6 | 0·009 | 0·5 |
| Creatinin | 0·4 – 1·3 | 0·9 | 0·014 | 0·8 |
| Hippuric acid | 0·4 – 1·0 | 0·7 | 0·010 | 0·6 |
| Xanthine, sarcine, etc. | 0·001–0·010 | 0·005 | — | — |
| Oxalic acid | 0·020–0·030 | 0·025 | — | — |
| Glycero-phosphoric acid | 0·010–0·020 | 0·015 | — | — |
| Propionic, valeric, caproic and butyric acids | 0·008–0·080 | 0·040 | — | — |
| Phenol, cresol, etc. | 0·005–0·020 | 0·010 | — | — |
| Sulphur dioxide in ethereal sulphates | 0·090–0·500 | 0·250 | — | — |
| Indoxyl sulphuric acid (calculated as indigo) | 0 005–0·019 | 0·008 | — | — |
| Thiocyanic acid | 0·001–0·008 | 0·005 | — | — |

[2] Authors consulted: J. Vogel, Loebisch, Kerner, Daiber, Hammarsten, Neubauer, Pflüger, Voit, Salkowski, Liebermann, Brieger, Hoffmann, Dragendorff, Munk, Hoppe-Seyler, Yvon and Berlioz, Lehmann, Uhle, Ranke, Furbringer, Geschleiden, Moritz, von Jacksch, Planer and Morin, Magnier, Robuteau, Gautier, Becquerel, Méhu, Halliburton, Charles, Parkes, Black, Bence-Jones, Tidy and Woodman, Beale, Parrot, Breed, Oliver, Thudichum, Weidner, Purdy, Tyson, Grüner, Jaffé, Rankin, von Franque, Oppenheim and Meyer.

| | Normal urine. Grammes. | Averages for adults. Man. Grammes urine in 24 hrs. | Man. Grammes per kilogramme of body-weight. | Woman. Grammes urine in 24 hrs. |
|---|---|---|---|---|
| Paraoxyphenylacetic, paraoxyphenylpropionic, dioxyphenylacetic, and paraoxyphenylglycollic acids | 0·010–0·030 | 0·020 | — | — |
| Bile salts | 0·0 –0·010 | 0·008 | — | — |
| Urobilin, urochrome, etc. | 0·080–0·140 | 0·125 | — | — |
| Carbohydrates | 0·014–0·075 | 0·044 | — | — |
| (Reducing power of normal urine equivalent to an average of three-tenths of one per cent. glucose.) | | | | |
| Sarco-lactic, succinic, glycuronic and oxaluric acids, acetone, inosite, cystin, taurin, urorubinogen, urorubin, pigment of Giacosa, scatoxylsulphuric acid (often in considerable amount), scatoxylglycuronic acid; nephrozymase, pepsin, and other ferments; pseudoxanthine, paraxanthine, heteroxanthine, guanine, adenine, etc.; pyrocatechin, hydroquinone, protocatechuic acid, etc. | traces | — | — | — |
| Chlorine | 5·0 –10·0 | 7·3 | 0·110 | 6·0 |
| Phosphorus pentoxide | 2·0 – 3·5 | 3·0 | 0·045 | 2·5 |
| Sulphur trioxide | 1·5 – 3·0 | 2·2 | 0·033 | 1·9 |
| Potassium oxide | 2·5 – 3·5 | 3·0 | 0·045 | 2·8 |
| Sodium oxide | 4·0 – 6·0 | 4·5 | 0·068 | 4 0 |
| Ammonia | 0·5 – 0·8 | 0·72 | 0·010 | 0·6 |
| Calcium oxide | 0·2 – 0·4 | 0·30 | 0·0045 | 0·28 |
| Magnesium oxide | 0·3 – 0·5 | 0·40 | 0·0066 | 0·35 |
| Iron | 0·001– 0·010 | 0·007 | — | — |
| Silicic acid, carbonic acid, hydrogen peroxide, nitrates, nitrites and metals; *e. g.*, manganese and copper | traces | — | — | — |

GASES[1] IN NORMAL URINE.

| | In 100 volumes of gas. c.c. | In one litre of urine. c.c. |
|---|---|---|
| Carbon dioxide | 65·40 | 15·957 |
| Oxygen | 2·74 | 0·658 |
| Nitrogen | 31·86 | 7 775 |
| | 100·00 | 24·390 |

CHEMICAL LABORATORY,
HAHNEMANN MEDICAL COLLEGE, PHILADELPHIA.

[1] Morin, after Loebisch.

# AN INVESTIGATION OF THE OFFICIAL PRUNUS VIRGINIANA, TO DISTINGUISH IT FROM BARKS COLLECTED AT OTHER SEASONS.[1]

BY GRACE E. COOLEY.

A contribution to the work of Research Committee C, of the Revision Committee U.S.P.

The U.S.P. prescribes that wild cherry bark be collected in autumn, when it yields the greatest amount of hydrocyanic acid. This investigation has failed to furnish any distinctive histological mark of the bark collected in autumn, and the results have tended to the belief that the suitable test is a chemical one, not readily to be found by the use of the microscope.

The following results are presented with tests which are found accurate, so far as they have been applied.

The researches of Fischer[2] have shown us the phases which starch undergoes in the bark and wood of most trees during the year. These have been verified with regard to *Prunus serotina*, and give us an easy means for rejecting all barks collected in summer and winter, for they contain no starch at all, or very little. During September and late summer the starch is being stored up in the bark, and reaches its maximum amount in October and the first days of November, just after leaf-fall. At this time all the cells of the medullary rays, and the bast parenchyma, as well as the chlorophyll-bearing cells, are crowded with starch, which occurs in *Prunus serotina*, in small round grains. This gradually disappears, first from the parenchyma of the bast, and last from the medullary rays. By the last of November the bark is nearly, if not quite, free from starch, and remains so during the winter. During the last days of February, or early in March, a process of starch regeneration begins. In specimens collected March 21st the parenchyma cells of the bast contained a few scattered grains, and there was a little in those cells of the medullary rays which lay close to the wood. Specimens of April 6th showed an increase in all the cells of the bark, and April 21st, the maximum was nearly reached, for the bast parenchyma and medullary rays, as well as the green cells, contained

[1] *Jour. Pharmacology*, 4, 167.

[2] Dr. Alfred Fischer, *Physiologie der Holzgewächse Jahrbücher für Wiss. Bot.*, 1891, Sec. 73.

much starch. At this time the bud scales were open far enough to disclose the leaves, which were, however, still folded closely together.

Bark collected in May contained very little starch; in some samples none appeared to be present, and in others a very little could be made out by the use of dilute iodine, when the specimen was heated. Collections of August 5th exhibited no starch in the cells of the bark.

The seasons of maximum amounts of starch in the bark are, then, autumn and spring, and if the bark, whether powdered or whole, contains much starch in all the parenchymatous cells, we are sure the collection was made shortly after the time of leaf-fall in autumn or before the leaves unfolded in the spring. A test based upon the presence of starch cannot exclude the spring collection, and spring is the time when the bark is least valuable, so far as the amount of hydrocyanic acid which it may yield is concerned.

To distinguish between the collections of spring and autumn, I have found the following color test for tannin applicable to those samples of *Prunus serotina* which I have been able to obtain. The amount of tannin in barks collected in spring is noticeably greater than that found in the collections of the autumn. I hesitate to submit the following as an authentic test, because I have not made extended tests for amounts of tannin to be found in the bark of *Prunus serotina* throughout the year, and because the reasons for the periodicity in amount and the phases of its fluctuation in plants have not, so far as I am aware, been fully made out. It seems a matter of observation that when great activity of growth is going on, tannin appears in greater amounts than usual. This observation seems to receive support in the case of *Prunus serotina*, as a much greater amount of tannin seems present in the bark during the active growth of spring than in the autumn.

The following test shows this to be the case:

Upon the surface of distilled water in a watch-glass, sprinkle a little of the powdered drug, which will spread, forming a thin film. Let it stand ten seconds, and then drop into it one drop of a 1 per cent. solution of ferric chloride. If the bark was collected in the spring, a cloudiness will appear in the water from the greenish precipitate, which is immediately formed. If the bark was collected in autumn, there will be no noticeable precipitate under twenty seconds. Powders of Nos. 20 and 50 exhibit this test equally well.

Tests for hydrocyanic acid and emulsin, though successfully carried out upon bitter almonds as first tried by Guignard,[3] failed of results when tried with the barks of *Prunus serotina.*

WELLESLEY, MASS., May, 1897.

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## BURDOCK AS A VEGETABLE.[1]

BY INAZO NITOBE.

The well-known definition of a weed by Emerson as "a plant whose virtues have not yet been discovered," is confirmed by the better agricultural authority of Schwerz, according to whom "a weed is a plant of which the direct uses are unknown to man." Both the poet-philosopher and the scientific farmer implicitly admit, I think, that as man brings more and more of nature under his control—in other words, as he brings more and more plants under cultivation, many of them, hitherto scorned as weeds, must cease to be considered as such. I have often seen ridiculed the Chinese custom of eating birds' nests, bears' claws and other incomprehensible delicacies, but I cannot help admiring the power of pantophagy on the one hand and the refinement of culinary skill on the other, which can convert into means of human enjoyment things apparently worthless and revolting. If, as philosophers say, civilization consists mainly in bringing natural forces under man's subjection, China must be given a high place in the scale of civilization from a culinary point of view.

Is it not a real triumph of art to extract food for man from so coarse and ugly a weed as burdock? Most books on botany in the English tongue describe burdock, Lappa major or officinalis, as a pestiferous weed, and many an agricultural bulletin gives careful instruction how to destroy it. Perhaps the only use that has been made of Lappa in America is for medicine. The root contains a bitter principle, a resin and tannin, and it is said to have an aperient and diuretic effect. It also has some reputation as an alterative in constitutional blood diseases, and the readers of *Garden and Forest* may have used the so-called "burdock tea." In Germany, where the three species, L. major, L. minor, L. tomentosa, are widely

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[3] *Guignard.* Sur. la localisation dans les plantes, des principes qui fournsisent l'acide cyanhydrique. *Comptes rendus*, 1890, p. 249.

[1] *Garden and Forest*, 10, 143.

spread, they were formerly much used as medicines under the name Radix Bardanæ, and they are even now regarded by some as good blood purifiers. Perhaps from the burr of the seeds the plant has the repute of power to stimulate a rich growth of hair, and an extract for this purpose is made from the roots. The peasants from the south of England use the roots as an antiscorbutic, and the leaves are employed in making a green elder ointment for the use of farriers.

All these medicinal uses are not to be despised, but they are unimportant when compared to the value of the plant as an edible vegetable; since the kitchen is more important than the drug store, the cook is nearer our hearts than the apothecary. Even in England the alimentary value of burdock was not always despised. Sowerby writes in his "Useful Plants of Great Britain:" "The stalks of the burdock, cut before the flowers open and stripped of their rind, form a delicate vegetable when boiled, similar in flavor to asparagus. In the raw state they may be eaten with oil and vinegar as salad. They were sometimes candied with sugar in the time of Bryant, as those of Angelica are. They are slightly laxative, but are perfectly wholesome. The roots of the plant are mildly diuretic and diaphoretic, and have been used with advantage in gout, rheumatism and calculous complaints. The decoction of the root is generally employed, but the seeds and leaves possess nearly the same properties, though the latter are slightly purgative. The bruised leaves are applied by the peasantry in some districts, in cataplasms to the feet, as a remedy for hysterical disorders."

In Japan, burdock grows wild in several places, but it is also extensively cultivated as a vegetable. Every one knows and eats "Gobo," the usual appellation for this plant, although a more refined and almost obsolete name is "kitakisu;" sometimes it is called "Uma (horse)-fuki (Nardosmia)." It is familiar to the Ainu under the name of "Seta (dog) koroki (Nardosmia)." Both the Ainu and the Japanese prefixes, "seta" and "uma," when applied to plants, seem to have much the same sense as the English "dog," in dogwood, dogbane, etc., and the "horse" in horse-radish, horse-chestnut, horse-mint, etc. The Ainu use it as food as well as medicine. They boil the tender shoots with beans, and the roots are put into soup. For medicinal uses the young leaves are softened by rolling them between the palms, and applied to skin eruptions. The Jap-

anese esteem Lappa for similar purposes. It is used in many preparations for its medicinal properties, which they believe—at least the old-fashioned empirics believe—consist in counteracting the action of some kinds of poisons. Grated and made into pulp, the roots are applied as a poultice in eruptions of the skin. But by far the more important use is made in the kitchen. As regards this plant we have outstripped the pantophagous Chinese, for they have not raised the plant to the dignity of a market vegetable. "When young," says a Chinese book on botany, "the tender leaves of the Lappa are cut and eaten as greens; the roots may be boiled or steamed and eaten, but people nowadays rarely use the plant." Among the Japanese, however, it has been under cultivation for years, and possibly for centuries. It enters the kitchen of every household, not being ostracised from the menu of the most high-toned restaurant. Thousands of acres are devoted to its culture. Official statistics for 1888 give the total production of Lappa in the country at about 72,000,000 pounds, valued at 422,1·34 yen. The roots average 350 grains in weight.

The production of so large a quantity is not at all to be wondered at when we recollect that Lappa ranks high in the scale of nutritive plants. In the amount of nitrogen it stands higher than potatoes, beets, carrots or turnips; in fact, few roots or tubers approach it. I append here its chemical composition, as compared with some other commonly used vegetables:

| | $H_2O$ | N | Ash | $K_2O$ | $Na_2O$ | CaO | MgO | $P_2O_5$ | $SO_3$ | $SiO_2$ | Cl |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Potatoes | 750 | 3·4 | 9·5 | 5·8 | 0·3 | 0·3 | 0·5 | 1 6 | 0·6 | 0·2 | 0·3 |
| Sugar Beets | 815 | 1·6 | 7·1 | 3·8 | 0·6 | 0·4 | 0·6 | 0·9 | 0·3 | 0·2 | 0·3 |
| Turnips | 720 | 1·8 | 6·4 | 2·9 | 0·6 | 0·7 | 0·2 | 0·8 | 0·7 | 0·1 | 0·3 |
| Carrots | 850 | 2·2 | 8·2 | 3·0 | 1·7 | 0·9 | 0·4 | 1·1 | 0·5 | 0·2 | 0·4 |
| Burdock | 738 | 5·6 | 10·5 | 4·3 | 0·2 | 1·1 | 2·0 | 0·9 | 0·7 | 0·1 | — |

So important a crop as burdock has, of course, many varieties developed, but the best known among them are few in number. They are usually named from the localities where they were first developed or where they thrive best. A variety known as the Takinozawa, raised chiefly near Tokyo, has a slender root, about 4 feet long, and is of very fine quality. In the vegetable market of Tokyo it commands a respectable price. The Owura variety, named from a small

place in the province of Shimosa, where they produce only about 2,000 roots a year, attains the huge size of 1 ½ feet in circumference, and 2 ½ feet in length; this kind is sold at the rate of about 20 sen (a sen being a hundredth part of a Japanese dollar) apiece. In its form this variety is like the beet. The two kinds most popular in the markets of Kyoto are the Yamato and the Horikawa; in fact, these seem to be only different names of the same variety.

In raising Lappa much attention is naturally devoted to the right selection of the soil. It is a common belief among cultivators that that a light sandy soil is specially adapted to it, and it is true that roots grown from such soil are long and slender, but they are prone to be hollow at the centre and rather tough at the rind. A stronger and deeper soil, say clayey loam, seems to impart firmness to the root and a better flavor. To gain the most satisfactory results, the soil must be plowed deep and finely pulverized, or else an undue amount of labor will be required in harvesting the roots. Indeed, digging burdock is a proverbially hard task; it has become almost a fine art to do it well. Many an old writer recommends digging the soil to the depth of some 4 or 5 feet, and then putting in green leaves, stalks, turf, and so forth, in a layer a foot deep, and covering that with the earth that was excavated. The surface must then be well hoed in both directions. So much care, however, is only necessary when exceptionally fine specimens, for show or otherwise, are aimed at. One peculiarity of Lappa is that it is not adapted to rotation; that is, it thrives better if planted continuously on the same soil; in new land the roots are likely to become forked. It is also grateful for good manures—compost, night-soil, and especially to rice-bran—but if compost is applied it must be well decomposed, or else the roots will throw off too many branches.

When the soil is properly prepared seeds are planted in rows 3 feet apart, five or six seeds being placed every 6 to 8 inches in a row. In Owura, the usual time for sowing is the early part of May or late in April. Before the early part of June the young plants are thinned out, leaving but one in the hill. Very often liquid manure is applied two or three times before the roots are harvested late in December. Another method is to plant the seeds in August, so as to have the vegetable ready for spring use, in which case they are sown more closely, since they do not grow as vigorously as those planted in spring. Lappa is a slow grower, and takes over

220 days to mature. Seeds retain their vitality for five years, and many a gardener asserts that the best crop is obtained from those three years old. They say that new seeds produce roots which throw off too many branches and flower-stalks. This statement, however, is not always verified. For keeping and marketing, the vegetable may simply be left where it was grown, or kept buried in the earth like beets or turnips.

I am aware that a discourse on burdock will be of little interest to Americans unless it contains some information regarding the mode of using it, but it must be remembered that Japanese cuisine differs widely from the American. I need only state in general terms that, after their skin is scraped or peeled off, the roots may be sliced into long strips or cut into pieces of less than an inch in length, and boiled with soy, salt or Spanish pepper, to impart savor to them; or, if boiled alone, they may afterwards be browned in sesame oil, which of itself will flavor them. Another common way of cooking them is to scrape off the outer skin and cut them into pieces about 2 inches long, then, when they are boiled soft, to take them out of the pan and mash them; then make them into cakes much as you treat oyster-plants. A kind of salad, though not uncooked, is also made of them. A rather unique and more elegant process consists in stuffing the roots with sea-eel, and boiling them, after dipping them in a preparation containing soy and pepper. Slices of Lappa fried and eaten with some condiments form one of the commonest dishes with us. The roots are sometimes pickled in miso. There are many other ways of preparing this valuable vegetable for table use, but a longer description would be interesting or amusing only to the curious. Each country has its own taste and national cookery.

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## BRIMSTONE IN SICILY.[1]

Through the courtesy of Messrs. Ferd. Baller & Co., of this city, I am enabled to submit the following statistics of Sicily brimstone, which, at this time, when the Anglo-Sicilian sulphur trust is endeavoring to absorb the business, will be of special interest. The currency quoted is not the gold lire to be estimated at 5·18 to the dollar, but that of paper, the average value of which for the period covered was about 5·50 to the dollar.

[1] *Consular Report*, Vol. 54, page 202.

*Exports from Girgenti, Licata, Catania, Termini and Palermo.*

| To— | July to December. | | | January to December. | | |
|---|---|---|---|---|---|---|
| | 1896. | 1895. | 1894. | 1896. | 1895. | 1894. |
| | *Tons.** | *Tons.** | *Tons.** | *Tons.** | *Tons.** | *Tons.** |
| Great Britain | 9 919 | 10,192 | 12,484 | 22,189 | 23,680 | 21,210 |
| South of France | 36,778 | 31,478 | 24,823 | 72,844 | 67,842 | 53,948 |
| North of France | 3,030 | 1,197 | 1,258 | 3,437 | 3,516 | 3,011 |
| Holland | 2,748 | 1,701 | 1,359 | 3,738 | 3 467 | 2,285 |
| Belgium | 3,724 | 3,425 | 2,913 | 7,605 | 6,567 | 5,743 |
| Germany: | | | | | | |
| Elbe | 9,755 | 7,272 | 7,716 | 15,954 | 14,364 | 14,439 |
| Baltic | 132 | 244 | 350 | 1,986 | 1,623 | 3,363 |
| Austria-Hungary | 5,876 | 4,706 | 4,525 | 13,690 | 11,637 | 11,286 |
| Russia | 8,456 | 7,959 | 8,684 | 18,455 | 18,461 | 18,646 |
| Sweden and Norway and Denmark | 4,534 | 2,794 | 2,744 | 14,266 | 6,154 | 7,055 |
| Spain | | 349 | 231 | 6,745 | 5,546 | 5,038 |
| Portugal | 24 | 1,459 | 1,200 | 11,996 | 14,556 | 8,493 |
| Italy | 12,894 | 12,351 | 9,485 | 54,435 | 55,723 | 54,533 |
| Greece, Turkey, and Balkan States | 187 | 736 | 522 | 18,869 | 16,444 | 17,302 |
| Morocco, Tunis, Algiers, and Tripoli | 245 | 236 | 1 | 826 | 368 | 168 |
| South Africa | .... | .... | .... | 1,430 | .... | .... |
| United States and Canada (Atlantic) | 63,129 | 61,551 | 58,321 | 123,476 | 99,586 | 106,665 |
| United States (Pacific) | 98 | .... | .... | 3,223 | .... | .... |
| South America | 727 | 1,041 | 369 | 1,833 | 2,095 | 469 |
| Asia | 487 | 922 | 135 | 1,033 | 1,524 | 576 |
| Australia | 120 | 108 | 32 | 1,281 | 2,639 | 1,150 |
| Other countries | 390 | 275 | 68 | 771 | 372 | 168 |
| Total | 163,253 | 149,996 | 137,220 | 400,082 | 356,164 | 335,548 |

*Tons of 13 Sicilian cantars.

*Production, exports, stocks, and prices of Sicily brimstone.*

| Description. | 1896. | 1895. | 1894. | 1893. | 1892. | 1891. |
|---|---|---|---|---|---|---|
| | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* | *Tons.* |
| Production,* official figures (in tons of 13 cantars) | .... | 342,150 | 355,023 | 363,414 | 362,948 | 336,975 |
| Exports† | 400,082 | 356,164 | 335,548 | 347,304 | 309,912 | 293,620 |
| Visible stocks at the end of December at— | | | | | | |
| Girgenti | 78,987 | 85,311 | 78,412 | 115,235 | 102,731 | 65 200 |
| Licata | 58,415 | 61,785 | 50,928 | 50,512 | 30,385 | 17,692 |
| Catania | 42,800 | 49,154 | 53,846 | 38,077 | 33,423 | 33,077 |
| Termini‡ | 4,892 | .... | .... | .... | .... | .... |
| Palermo | 15,475 | 17,418 | 17,418 | .... | .... | .... |
| Total | 200,569 | 213,668 | 200,604 | 203,824 | 166,539 | 115,969 |
| Prices at Girgenti on the 31st of December, per ton of 1,000 kilograms, first cost: ‖ | *Lire.* | *Lire.* | *Lire.* | *Lire.* | *Lire.* | *Lire.* |
| Best unmixed seconds | 89.90 | 55.00 | 61.60 | 75.50 | 81.00 | 125.00 |
| Best thirds | 88.90 | 52.20 | 55.00 | 65.60 | 75.50 | 118.90 |

*Quantities carried by rail from the stations in the interior to the ports, 303 830 tons of 13 cantars, during the financial year July to June, 1895-96, against 287,840 tons in 1894-95.

† In the exports for the years 1891, 1892 and 1893, those from Termini and Palermo are not included, which, during 1894 to 1896, amounted to 6,000 to 13,000 tons per annum. To calculate the total consumption, 10,000 tons have to be added, representing the estimated yearly consumption in Sicily.

‡ Stocks at Termini for the years preceding 1896 are wanting, but were probably smaller.

‖ Since the 1st of October, 1896, the export duty of 11 lire per 1,000 kilograms was abolished.

After a careful study of the above figures, I think the readers of this report will recognize the truth of the following deductions:

(1) The exports of sulphur from Sicily in 1896 were 44,000 tons in excess of 1895, of which 31,000 tons were exported from January to July. This increase is to be attributed to the exceedingly low prices which prevailed toward the close of 1895 and the beginning of 1896, at which figures the working of a majority of the mines was unprofitable. The increase of 13,000 tons in the last six months of 1896 is undoubtedly due to the sudden advance in prices, which induced consumers to lay in heavy stocks in anticipation of a further rise. These stocks, however, cost them relatively low prices.

(2) By reference to the table of exports, stocks and prices for 1891–1896, it will be observed that, although prices steadily declined during those years, the production, as estimated by the mining bureau, frequently increased and never decreased. Stocks show a constant increase. These facts unquestionably prove that the cost of production has diminished, cheaper transportation has been gained by the construction of roads and railways, and improvements have been made in mining and smelting. It follows, therefore, that production at the lower prices has continued steadily, because it was found profitable.

(3) The increase of exports during these years is natural, because the large production had to be sold, and this was made possible by the fall in prices.

(4) The Italian Parliament abolished the export duty of 8*s.* 6*d.* ($2.06) per ton with the object of favoring exports, since this duty increased the cost to the foreign consumer. The artificial advance which the Anglo-Sicilian sulphur trust wishes to establish is, therefore, in opposition to all the above facts, although the latter are responsible both for the decline in price for several years and the abolition of the export duty.

(5) It is stated that the production in 1896 shows an increase, and although the statistics are not yet published, there is the best authority for estimating it at about 385,000 tons. That there really was an increase is confirmed by the following facts: There were shipped, in 1896, 44,000 tons more than in 1895, but nevertheless the visible stock in the ports of Sicily on the 31st of December, 1896, was only 18,000 tons less than on the same date in 1895. The difference of 26,000 tons must, therefore, come from an increase of pro-

duction, which, in part at least, belongs to 1896, as some of this quantity may be sulphur stored in the mines in 1895, and not shipped promptly. Further, the quantity carried by rail from the stations in the interior to the ports was larger in the fiscal year 1895–96 than in 1894–95.

(6) Everything points to an increased production for 1897, and if the present prices check the consumption, stocks must necessarily increase during the year.

(7) Should Sicilian brimstone be partly replaced in the United States by pyrites for the manufacture of sulphuric acid, this will diminish our imports, which have been from 100,000 to 125,000 tons per annum, or 25 to 30 per cent. of the total production of Sicily.

(8) For the above reasons, it seems more than doubtful that the Anglo-Sicilian sulphur trust can succeed in maintaining the prices at the present artificial point for any length of time. Its capital is £750,000 ($3,649,885) and it has purchased its brimstone at about 65*s.* ($15.80) per ton free on board Sicily, plus all the other expenses.

CHAS. M. CAUGHY,
*Consul.*

MESSINA, March 29, 1897.

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## STUDY OF THE AMERICAN MEDICINAL FLORA.

The Sub-Commission of the Pan-American Medical Congress, appointed to study the medicinal plants of the United States, has entered into an association with the Smithsonian Institution for that purpose. The attention of our readers is called to the respective circulars issued by these organizations, which we print below:

SMITHSONIAN INSTITUTION, WASHINGTON, D. C.,
May 28, 1897.

DEAR SIR:—The Smithsonian Institution has undertaken to bring together all possible material bearing on the medicinal uses of plants in the United States. Arrangements have been made with a body representing the Pan-American Medical Congress, the Sub-Commission on Medicinal Flora of the United States, to elaborate a report on this subject, and the material when received will be turned over to them for investigation.

The accompanying detailed instructions relative to specimens and notes have been prepared by the Sub-Commission.

All packages and correspondence should be addressed to the Smithsonian Institution, Washington, D. C., and marked on the outside *Medicinal Plants, for the U. S. National Museum.*

Franks which will carry specimens, when of suitable size, together with descriptions and notes, free of postage through the mails, will be forwarded upon application. Should an object be too large for transmission by mail the sender is requested, before shipping it, to notify the Institution, in order that a proper authorization for its shipment may be made out.

Respectfully,

(Signed) S. P. LANGLEY, *Secretary.*

INSTRUCTIONS RELATIVE TO MEDICINAL PLANTS.

The Pan-American Medical Congress, at its meeting held in the City of Mexico, in November, 1896, took steps to institute a systematic study of the American medicinal flora, through the medium of a General Commission and of special Sub-Commissions, the latter to be organized in the several countries. The Sub-Commission for the United States has been formed, and consists of Dr. Valery Havard, U. S. A., Chairman; Mr. Frederick V. Coville, Botanist of the U. S. Department of Agriculture; Dr. C. F. Millspaugh, Curator of the Botanical Department of the Field Columbian Museum, Chicago; Dr. Charles Mohr, State Botanist of Alabama; Dr. W. P. Wilson, Director of the Philadelphia Commercial Museums; and Prof. H. H. Rusby, of the New York College of Pharmacy. This Sub-Commission solicits information concerning the medicinal plants of the United States from every one in a position to accord it. The principal points of study are as follows:

(1) Local names.

(2) Local uses, together with historical facts.

(3) Geographical distribution and degree of abundance in the wild state.

(4) Is the plant collected for market, and if so—

(*a*) At what season of the year?

(*b*) To how great an extent?

(*c*) How prepared for market?

(*d*) What is the effect of such collection upon the wild supply?

(*e*) What price does it bring?

(*f*) Is the industry profitable?

(5) Is the plant, or has it ever been, cultivated, and if so, give all information on the subject, particularly as to whether such supplies are of superior quality, and whether the industry has proved profitable?

(6) If not cultivated, present facts concerning the life history of the plant which might aid in determining methods of cultivation.

(7) Is the drug subjected to substitution or adulteration, and if so, give information as to the plants used for this purpose?

While it is not expected that many persons will be able to contribute information on all these points concerning any plant, it is hoped that a large number of persons will be willing to communicate such partial knowledge as they possess.

It is not the important or standard drugs alone concerning which information is sought. The Sub-Commission desires to compile a complete list of the plants which have been used medicinally, however trivial such use may be. It also desires to collect all obtainable information, historical, scientific and economic, concerning our native and naturalized plants of this class, and, to that end, invites the co-operation of all persons interested. Poisonous plants of all kinds come within the scope of our inquiry, whether producing dangerous symptoms in man, or simply skin inflammation, or, as "loco-weeds," deleterious to horses, cattle and sheep. In this respect the general reputation of a plant is not so much desired as the particulars of cases of poisoning actually seen, or heard from reliable observers. It is believed that much interesting knowledge can be obtained from Indians, Mexicans and half-breeds, and that, consequently, Indian agencies and reservations are particularly favorable fields for our investigation. Such knowledge will be most acceptable when based upon known facts or experiments.

In order to assist in the study of the habits, properties and uses of medicinal plants, the Sub-Commission undertakes to furnish the name of any plant-specimen received, together with any desired information available.

Owing to the diversity in the common names of many plants, it will be necessary for reports, when not furnished by botanists or others qualified to state the botanical names with certainty, to accompany the same with some specimen of the plant sufficient for its identification. While the Sub-Commission will endeavor to determine the plant from any portion of it which may be sent, it should be appreciated that the labor of identification is very greatly decreased, and its usefulness increased, by the possession of complete material, that is, leaf, flower and fruit, and in the case of small plants, the underground portion also. It is best to dry such specimens thoroughly, in a flat condition under pressure, before mailing. While any convenient means for accomplishing this result may be

employed, the following procedure is recommended: Select a flowering or fruiting branch, as the case may be, which, when pressed, shall not exceed 16 inches in length by 10 inches in width. If the plant be an herb 2 or 3 feet high, it may be doubled to bring it within these measurements. If it possess root leaves, some of these should be included. Lay the specimen flat in a fold of newspaper and place this in a pile of newspapers, carpet felting, or some other form of paper which readily absorbs moisture, and place the pile in a dry place under a pressure of about 20 to 30 pounds, sufficient to keep the leaves from wrinkling as they dry. If a number of specimens are pressed at the same time, each is to be separated from the others by three or four folded newspapers or an equivalent in other kinds of paper. In twelve to twenty-four hours these papers will be found saturated with the absorbed moisture, and the fold containing the specimens should be transferred to dry ones. This change should be repeated for from two to five days, according to the state of the weather, the place where the drying is done, the fleshiness of the specimens, etc. The best way to secure the required pressure is by means of a pair of strong straps, though weights will do. The best place for drying is beside a hot kitchen range. When dry the specimens should be mailed between cardboards or some other light but stiff materials which will not bend in transit.

It is a most important matter that the name and address of the sender should be attached to the package and that the specimens, if more than one, should be numbered, the sender retaining also specimens bearing the same number, to facilitate any correspondence which may follow. The Sub-Commission requests that, so far as practicable, all plants sent be represented by at least four specimens.

(Signed) H. H. Rusby, M.D.,
Chairman of the General Commission,
New York College of Pharmacy.

Valery Havard, M.D.,
Chairman of the Sub-Commission,
Fort Slocum, Davids Island, New York.

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The death of Prof. Dr. *Pieter Cornelio Plugge*, of Gröningen, Netherlands, has been announced. He held the chair of Pharmacy and Toxicology in the University of his native town. His death occurred June 30, at the Royal Botanical Gardens, Buitenzorg, Java, whither he had been sent by the Dutch Government on a scientific mission.

# EDITORIAL.

## NOTABLE PHARMACEUTICAL GATHERINGS DURING AUGUST.

The month of August, this year, will witness the assembling of a larger number of pharmacists in various parts of the world than is usual during so short a time.

Early in the month will be the British Pharmaceutical Conference at Glasgow, Scotland. This body is noted for the large amount of scientific work it can accomplish in a short time. The Eighth International Pharmaceutical Congress will follow, at Brussels, Belgium, on the 14th. The scope of this assembly was sufficiently set forth in the March number of this JOURNAL, page 161. The American Pharmaceutical Association has appointed the following delegates: Prof. Joseph P. Remington, of Philadelphia, and Mr. Louis Dohme, of Baltimore, with Dr. Frederick B. Power, of London, and Mr. Adolph Meyer, of New Orleans, as alternates.

Of the associations not strictly pharmaceutical, we will have the meeting of the American Association for the Advancement of Science, at Detroit, on the 9th; that of the American Chemical Society at the same place during the same week; and on the 19th the Twelfth International Medical Congress, at Moscow, Russia. This last has issued a formidable programme of 71 pages,in the French language, and containing some hundreds of titles of papers to be presented from physicians and others, from all over the world. If 1 per cent. of the promises should be redeemed, it would still scarcely be possible to have them all read during the eight days that the fifteen sections of the Congress will be in session. In addition to the papers, ten addresses have been promised; these are to be delivered before the general assembly.

Returning to the strictly pharmaceutical meetings, we will have that of the American Pharmaceutical Association at Lake Minnetonka, Minn., from the 24th to the 31st, inclusive. The following programme has been adopted by the Council:

TUESDAY, August 24th.

| | |
|---|---|
| Council Meeting | 11.00 A.M. |
| First General Session | 2.30 P.M. |
| Meeting of the Nominating Committee | 6.00 P.M. |
| Reception and Promenade Concert | 8.30 P.M. |

WEDNESDAY, August 25th.

| | |
|---|---|
| Second General Session | 10.00 A.M. |
| Commercial Section | 2 30 P.M. |
| Travellers' Entertainment | 8.30 P.M. |

THURSDAY, August 26th.

| | |
|---|---|
| Scientific Section | 10.00 A.M. |
| " " | 2.30 P.M. |
| " " | 8.30 P.M. |

FRIDAY, August 27th.

| | |
|---|---|
| Section on Pharmaceutical Education and Legislation | 10.00 A.M. |
| " " " " | 2.30 P.M. |
| " " " " | 8.30 P.M. |

SATURDAY, August 28th.

Third General Session (Final Business) . . . . . . . . . . 10.00 A.M.
Boat Ride . . . . . . ( " Session) . . . . . . . . . . . 4.00 P.M.
Lectures by President Northrup and Prof. F. J. Wulling, of the University of Minnesota . . . . . . . . . . . . . . 8.00 P.M.

SUNDAY, August 29th.

Devoted to rest.

MONDAY, August 30th.

Trip to Taylor Falls and Dells of St. Croix.

TUESDAY, August 31st.

Trip by cars and carriages through the Twin Cities (Minneapolis and St. Paul).

EVENING, BANQUET.

The arrangements about transportation have not yet been completed. It is understood, however, that a one-fare rate has been secured from Chicago and St. Louis. Members desiring to start from either of those cities should address Mr. A. E. Ebert, of Chicago, or Prof. H. M. Whelpley, of St. Louis. Professor Caspari, of Baltimore, is arranging for a lake trip of three days from Buffalo to Duluth; those desiring to go by water should address him.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

AN ILLUSTRATED FLORA OF THE NORTHERN UNITED STATES, CANADA AND THE BRITISH POSSESSIONS, from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean Westward to the One Hundred and Second Meridian. By Nathaniel Lord Britton, Ph.D., and Hon. Addison Brown. In three volumes. Vol. II. Portulacaceæ to Menyanthaceæ, Portulaca to Buckbean. New York. Charles Scribner's Sons. 1897.

The first volume of this illustrated flora was reviewed in the AMERICAN JOURNAL OF PHARMACY, November, 1896, p. 630, the second volume containing the work in the sequence of the *Naturliche Pflanzenfamilien*, by Engler and Prantl, to the buckbean family, has now been issued. The publishers are to be congratulated upon the prompt publication of a work requiring so much original labor of authors, artist, engraver and printer. This volume contains 647 pages, and the binding, typography, illustrations, descriptions, bibliographical references and the other excellent features of the preceding volume have been fully maintained.

The second volume contains figures of 1,467 species. In most instances these are good representations, but in a few we are disappointed. The magnitude of the author's undertaking is such that the students of our flora will willingly overlook these minor defects.

As was to have been expected, the adherence to the Rochester rules of nomenclature has presented us with a number of new binomials for our old friends, as, for example, our common apple becomes Malus malus (L.), Britton and American Wistaria (the erroneous spelling *Wisterea* is persisted in), becomes Kraunhia frutescens (L.) Greene. The rigid enforcement of the law of priority is illustrated on page 358, where Polygala viridescens L. replaces the familiar P. sanguinea L., both having been used by Linnæus, on page 705,

Species Plantarum, 1753. It is our intent to more carefully note the changes necessitated in the names of medicinal plants, upon the completion of Volume III.

A cursory examination of the volume exhibits great freedom from typographical errors and comparatively little for criticism. On page 345 we are informed that Oxalis acetosella "yields the druggists' salt of lemon." The modern methods of manufacturing the oxalates have displaced such a primitive source.

The distribution of plants is generally accurately given. The existence of Ilicioides mucronata (L.) Britton, (Nemopanthes fascicularis, Raf.), in New Jersey, has, however, escaped attention.

The authors have aimed to incorporate the most recent contributions and studies of the different genera and orders. Consequently some very recently described plants are figured here. Of these may be mentioned as examples Potentilla littoralis, Rydberg, 1896; Cratægus Vailiæ, Britton, 1896; Prunus Gravesii, Small, 1897; Viola atlantica, Britton, 1897. The treatment of many groups show critical study on the part of the authors. Several entirely new species are described, and a very general tendency through the volume is to elevate well-marked varieties of previous authors to specific rank, and a number of species discarded in Gray's Manual have been revived.

Another commendable feature of the work is the introduction of many foreign plants that have escaped from cultivation, or otherwise become distributed in waste places. This renders the book especially valuable to the botanists in our seaport cities, who collect on the ballast grounds.

It is an up-to-date book, and a most valuable contribution to the literature of systematic botany, and we eagerly await the appearance of the final volume.

G. M. B.

Die Neuen Arzneidrogen aus dem Pflanzenreiche. Von Dr. Carl Hartwich, Professor der Pharmakognosie am Eidgenössichen Polytechnikum in Zürich. Verlag von Julius Springer, Berlin, 1897. Preis, M. 12.

During the past several years, the additions to the list of medicinal drugs from the vegetable kingdom has been so rapid that in self-protection one is driven to devise some kind of a system by which to keep track of them. The author prepared for his own use an alphabetical list of such new drugs, with a brief statement concerning each of them, and a number of references to the literature of the subject. The result was so satisfactory that he decided to elaborate the same and publish it. We have, in consequence, a book of some 469 pages, filled with matter which is not only compactly printed, but, what is more important, compactly stated. Any one interested in new plant drugs, if he has only a moderate familiarity with the German language, will find this book of the greatest value.

An introduction of twenty-three pages gives a general view of the subject, and points out the rapidity and extent to which new plant drugs have been recognized by the various pharmacopœias. Following this is the special part which constitutes the great bulk of the work, and which consists of short notices of new plant drugs, arranged in alphabetical order. The names and synonyms of each are given, then follow short descriptions, habitat, uses, chemical composition, etc., not always in the same order; the latter feature has

some advantages, since it renders this part more readable, and does away with what would tend towards a tabular presentation of the subject. A few lines of references are finally added, and enough is before one concerning a drug to enable him to have an intelligent idea about it, or to prosecute his studies further elsewhere.

An appendix of some 30 pages follows the special part, and includes some of the very newest drugs. This is followed by a literary index of books and journals used in the references. The author was somewhat in doubt about arranging the subjects in alphabetical order, but he had found it best for his own use, so he allowed it to stand; but in order to make the work more complete he added an index of the plants, arranged according to the natural system. Finally, there is a very complete general index.

There is no doubt but this work will facilitate the study of plant drugs, and aid in bringing some of them more prominently before the two professions of pharmacy and medicine.

ON THE PRESENCE OF A TRUE MANNA ON A "BLUE GRASS," ANDROPOGON ANNULATUS. By R. T. Baker, F.L.S., and Henry G. Smith, F.C.S. Reprint of paper read before the Royal Society of New South Wales, December 2, 1896.

In addition to identifying this substance as a true manna, the authors have made quite a study of it from botanical, chemical and economic standpoints. The paper is illustrated by two full-page plates, and a bibliography of the literature of eucalyptus manna and lerp has been appended.

REPORT OF THE COMMITTEE APPOINTED BY THE NATIONAL ACADEMY OF SCIENCES UPON THE INAUGURATION OF A FOREST POLICY FOR THE FORESTED LANDS OF THE UNITED STATES, TO THE SECRETARY OF THE INTERIOR. Washington. Government Printing Office, 1897.

This report is the result of the appointment of a committee by the president of the National Academy of Sciences, on the request of the Secretary of the Interior. The report is an exhaustive one, and after discussing the whole subject of forestry in the United States, the results are condensed into conclusions and recommendations that are easily comprehended. A number of bills are offered for presentation to Congress to enable the recommendations to be carried out. The committee is composed of the following well-known experts: Charles S. Sargent, Henry L. Abbott, A. Agassiz, Wm. H. Brewer, Arnold Hague, Gifford Pinchot, Wolcott Gibbs.

UEBER ISOMERE MENTHYLAMINE UND MENTHENE. By D. T. Werner. Inaugural Dissertation. Göttingen, 1897.

This is the result of a careful study of the properties of dextro- and lævo-rotary menthylamine.

THE NATIONAL CONFECTIONERS' ASSOCIATION OF THE UNITED STATES. 1897. This Association has done a good work in compiling, in a neat volume of 186 pages, all the "pure food and pure candy laws" in force in the United States, April 1, 1897. There is great lack of uniformity among the different States; many have no food or candy laws, others have both, and a number hold that candy is a food, and therefore apply the provisions of the pure food law to it.

REPORT OF THE FIFTEENTH ANNUAL PROCEEDINGS OF THE LOUISIANA STATE PHARMACEUTICAL ASSOCIATION, held at New Orleans, May 11 to 13, 1897.

Two original communications were received and read at this meeting, viz.: "Does a College of Pharmacy Education Possess any Advantages over that Gained by Long Practical Experience?" by Dr. T. A. Quayle; and "How to Increase our Membership," by Leon Barthet. A number of interesting reports were also presented. The Association is doing a good work by endeavoring to introduce the *National Formulary*, and thereby have physicians prescribe the preparations contained in it.

## MINUTES OF THE COLLEGE MEETING.

The quarterly meeting of the College was held June 28, 1897, with President Bullock in the chair. The minutes of the Board of Trustees for April, May and June were read and adopted.

A communication from Chairman Beale, of the Section on Pharmaceutical Education and Legislation, of the American Pharmaceutical Association, was presented. It consisted of a list of interrogatories bearing upon the construction of a uniform pharmacy law for all the States. This document was deemed altogether too voluminous and comprehensive to be properly considered in the limited time at the disposal of the College, and action upon it was postponed.

Mr. E. M. Boring offered a resolution, which appeared to involve a modification of the charter, and the spirit of which resolved itself into two queries, which the Secretary was directed to submit to the College Counsellors for an opinion. These queries were as follows:

"Can the College restrict the eligibility of members to serve in the Board of Trustees to such only as do not receive emoluments for service rendered the College?"

"Should the Board of Trustees deem it desirable to elect one or more of the faculty associate members of the Board without voice unless requested, and also without vote, can it do so?"

The chairman appointed the following delegates to the meeting of the American Pharmaceutical Association: Samuel P. Sadtler, F. W. E. Stedem, Josiah C. Peacock.

WILLIAM B. THOMPSON, *Secretary*.

## OBITUARY.

*Prof. Dr. Karl Remigius Fresenius.*—On the 11th of June Professor Fresenius, the noted chemist, died at Wiesbaden, Germany, in the seventy-ninth year of his age, of heart disease.

He was born at Frankfort-on-the-Main, December 28, 1818, and obtained his education for the most part in the schools of that city. In 1836 he was apprenticed as an apothecary, and while pursuing this vocation attended lectures on chemistry and physics. Later he became a student at the University of Bonn, and, in 1841, went to Giessen as assistant in Liebig's laboratory. In 1843 he accepted a position as private instructor in chemistry at the University of Giessen, where, however, he remained only two years, when he was called to the Agricultural Institute of Wiesbaden as professor of the natural sciences.

Here, in 1848, he established his famous private laboratory, to which was added, in 1862, a pharmaceutical department.

As is well known, Professor Fresenius devoted his attention chiefly to the subject of Analytical Chemistry, and his "Anleitung zur qualitative chemischen Analyse" and "Anleitung zur quantitative chemischen Analyse" have gone through a number of editions, and have been translated into almost every living tongue. In addition to his other literary labors, he was editor of the *Zeitschrift für analytische Chemie* since 1862.

In recognition of his services as a scientist, numerous honorary titles and orders of distinction were bestowed upon Professor Fresenius by various societies and scientific bodies, both in Germany and in other countries, and in 1893 he was elected an honorary member of the Philadelphia College of Pharmacy.

*Prof. Julius von Sachs.*—On the 29th of May Professor von Sachs, the famous botanist, died at Würzburg, Germany, where he had resided since 1868. He was born at Breslau, in 1832, and his life was enriched by labors which have had a distinct and decided influence on the advances made in recent years in scientific botany, particularly plant physiology and the principles of causality as applied to plant life.

Professor Sachs was a voluminous writer, and of his works the following may be mentioned: "Botanical Experimental Physiology," "Text Book of Botany," "History of Botany" (from 1600 to 1860), and "Lectures on Plant Physiology." He was not only distinguished as an author, but was an accomplished lecturer, and had devoted the greater part of his life to teaching. For twenty-nine years he had been Professor of Botany at Würzburg, and for a time during the early part of his scientific career was assistant to Purkinje at Prague.

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## NOTES AND NEWS.

*Professor J. B. Nagelvoort* has resigned the chair of Pharmaceutical Chemistry in the School of Pharmacy, Northwestern University, and is at present in Amsterdam, Netherlands. Some of his contributions on pharmacy in the United States have recently appeared in the *Pharmaceutisch Weekblad* of Rotterdam.

The *Hanbury Medal* has been awarded for this year to Dr. John E. De Vrij, of The Hague. He was born in Rotterdam in 1813. The President of the British Pharmaceutical Society, in announcing the award, said: "It was interesting to note that in this year of the Diamond Jubilee the award was made to a gentleman who, although not an Englishman, had an order conferred by Her Majesty, he being a Companion of the Order of the Indian Empire, that distinction having been given him for work done in connection with cinchona cultivation in India. It was also interesting to remark that the first paper published by Dr. De Vrij was written about four years before Her Majesty came to the throne. Since that time he had been an indefatigable worker in original research connected with the chemistry and natural history of drugs, partly in connection with cinchona. He began life as a pharmacist, and had been connected with pharmacy ever since."

THE AMERICAN
JOURNAL OF PHARMACY

*SEPTEMBER, 1897.*

# CAN NORTHERN SENEGA, SOUTHERN SENEGA, EUONYMUS AND QUILLAJA BE DISTINGUISHED FROM ONE ANOTHER IN THE POWDERED STATE BY THE MICROSCOPE?

BY L. E. SAYRE,

Member of Research Committee C of the Revision Committee of the U. S. P.—
*Preliminary Paper.*

This is the question which the present investigation endeavors to answer. As usual, the structural elements of the different drugs were studied in their fixed relations by means of sections, and their subsequent conduct and appearance after powdering observed. In general it may be stated that while it is quite easy to recognize the differences between the senegas and the other drugs, no point of distinction could be established for the two senegas. This is easily understood when it is observed that the two varieties of the one drug have present the same elements in relatively equal proportions, while each of the others possesses characteristic elements not present, or differently represented, in the other drugs.

The sections of senega, both northern and southern, are easily distinguished by the marked difference in the thickness of the roots and in the *arrangement* of the tissues, but we are not surprised to find the powders appearing very much the same under the microscope. In passing through the mill and the sieve, characteristic arrangements are destroyed and points of distinction obliterated. Owing to this fact it is the author's opinion that no satisfactory

microscopical test can be established for distinguishing either senega from the other.

In detail it may be observed that the No. 60 powder of senega

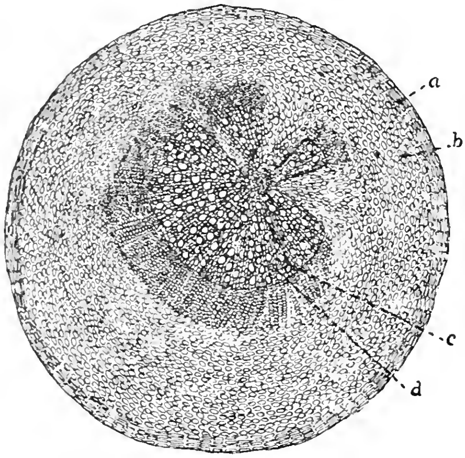


*Fig. 1.* Cross-section Senega (Northern variety); *a*, cork cells; *b*, parenchyma; *c*, woody tissue; *d*, tracheæ.

shows mainly the suber and the parenchymatous tissues in tolerably regular masses, while the woody centre is but rarely observed. The soft parenchyma is sometimes broken longitudinally and sometimes

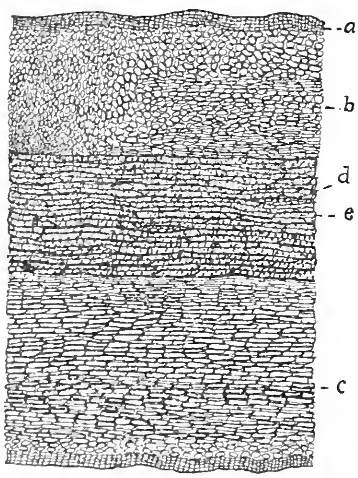


*Fig. 2.* Longitudinal section Senega (Northern variety); *a*, cork cells; *b*, parenchyma; *c*, parenchyma; *d*, woody cells; *e*, tracheæ.

transversely, so that we get appearances characteristic of the sections made in these two directions.

As might be supposed from the appearance of the sections, no difficulty exists in distinguishing apart the powders of senega and

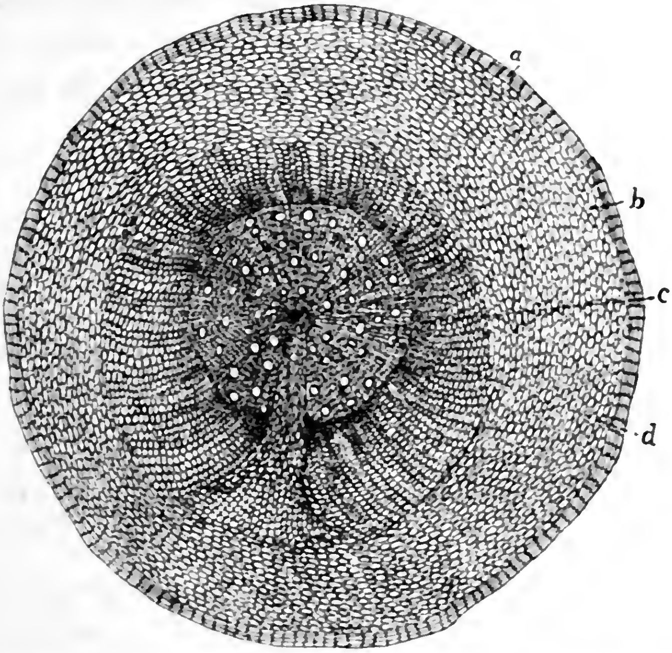


*Fig. 3.* Cross-section Senega (Southern variety); *a*, cork cells; *b*, parenchyma; *c*, woody centre; *d*, tracheæ.

quillaja. In the latter drug are found elements not at all represented in the senega. Attention is called to the strongly marked medullary rays, to the sclerotic tissue, to the bast fibres, and more

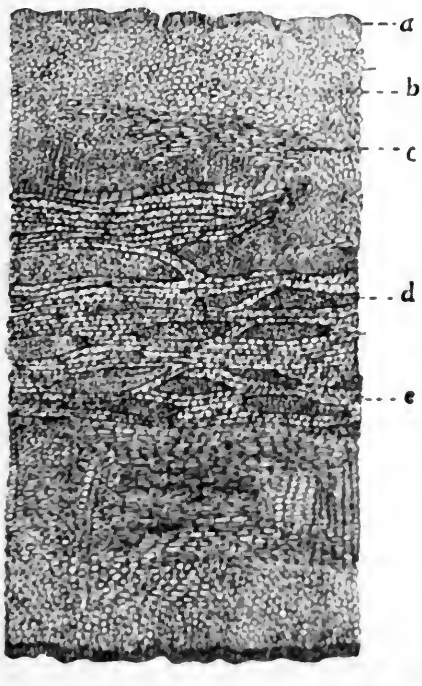


*Fig. 4.* Longitudinal section Senega (Southern variety); *a*, cork cells; *b*, parenchyma; *c*, parenchyma; *d*, woody cells; *e*, tracheæ.

particularly to the numerous and easily observed prismatic crystals of calcium oxalate. Any or all of these clearly mark the powder of quillaja, and would at once betray its presence in the powder of senega.

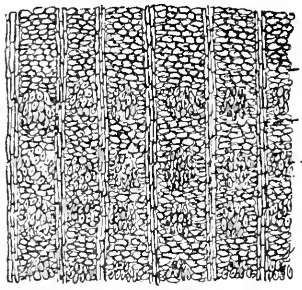


*Fig. 5.* Cross-section Quillaja; *a*, parenchyma; *b*, medullary rays; *c*, bast fibres.

Again, in the case of the powder derived from the root bark of euonymus, we encounter elements that serve as points of distinction between it and the other drugs here considered. In this instance

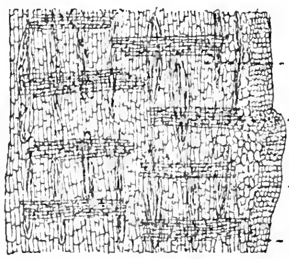


*Fig. 6.* Longitudinal-radial section of Quillaja; *a*, sclerotic cells; *b*, medullary rays; *c*, bast fibres; *d*, cork cells.

the most marked characteristic is the fragment of large-celled suberous tissue, which so frequently exhibits a concentric arrangement. In addition, the fragments of cortical parenchyma, crossed by the narrow remains of medullary rays, appear numerously and distinctly

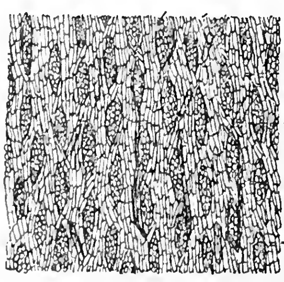


*Fig. 7.* Longitudinal-tangential section of Quillaja; *a*, sclerotic cells; *b*, bast fibres; *c*, crystal; *d*, medullary ray.

before the observer. The bast cells would also serve to distinguish euonymus from senega.

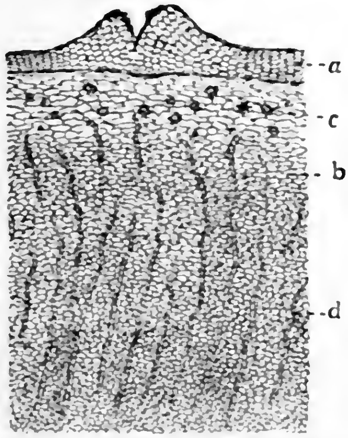


*Fig. 8.* Euonymus bark of root; *a*, suber; *b*, parenchyma; *c*, crystal; *d*, medullary ray.

After having established these points of difference between senega and its adulterants, numerous samples of powdered senega were examined, but no adulteration was discovered. It would appear

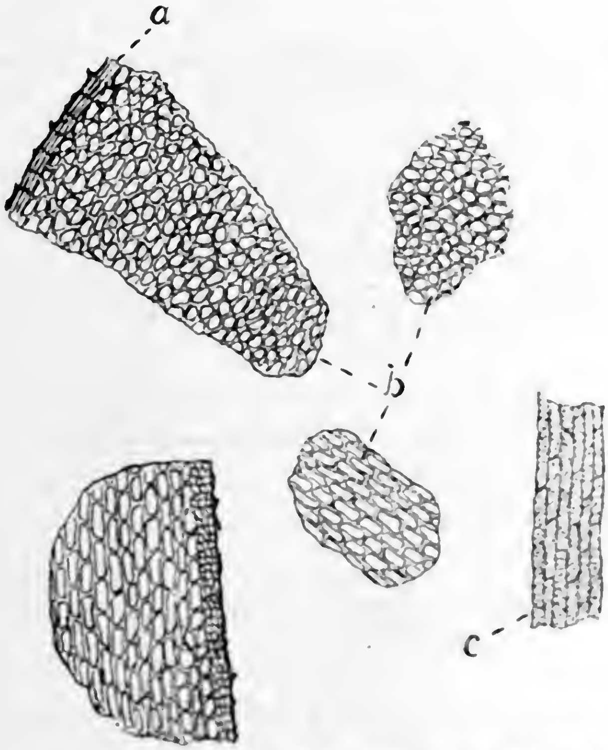


*Fig. 9.* Senega powder magnified 75 diameters; *a*, suber; *b*, parenchyma; *c*, tracheæ (rarely found in No. 60 powder).

from this that powdered senega is not difficult to secure in the pure condition.

The drawings accompanying this are supposed to be self-explana-

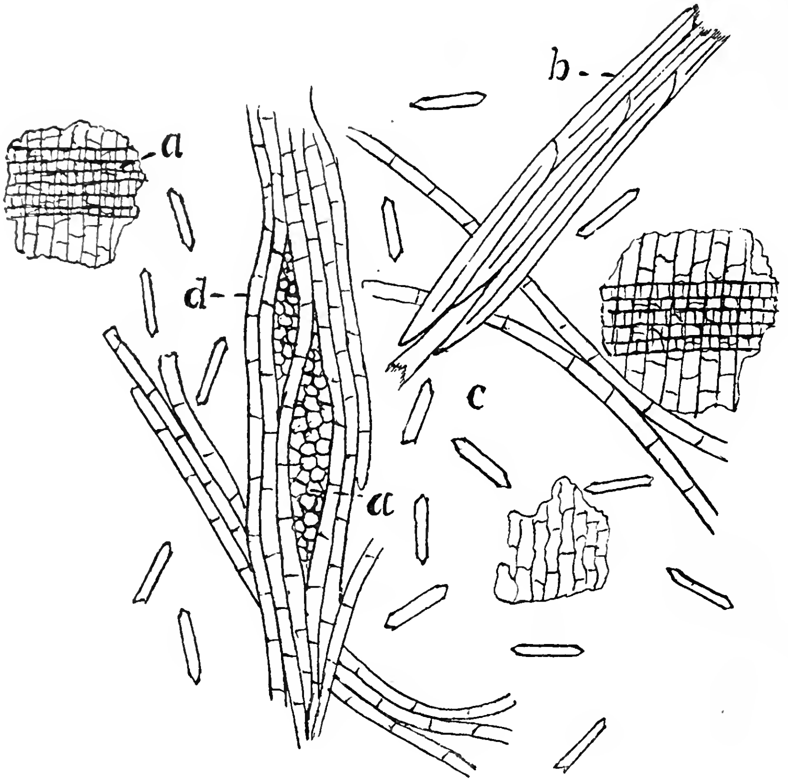


*Fig. 10.* Powder of Quillaja magnified 75 diameters; *a*, medullary ray; *b*, bast; *c*, crystals of calcium oxalate; *d*, sclerotic tissue.

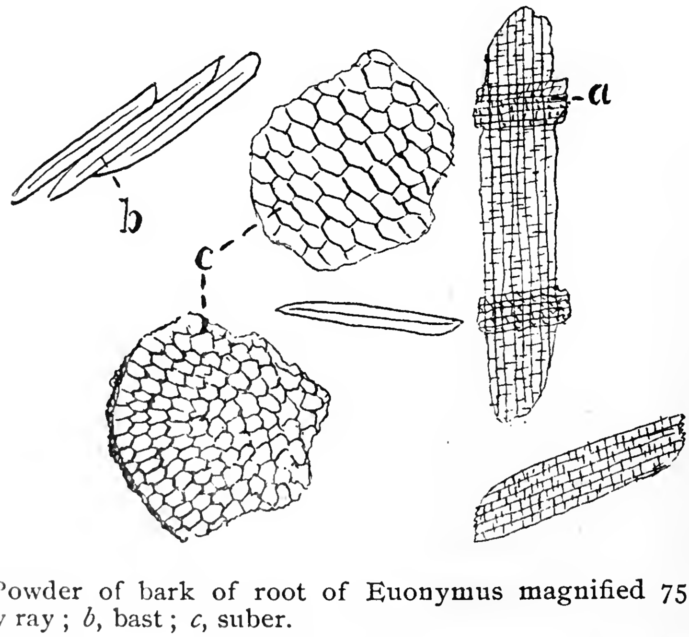


*Fig. 11.* Powder of bark of root of Euonymus magnified 75 diameters; *a*, medullary ray; *b*, bast; *c*, suber.

tory, and show the appearance of the drugs under consideration in as nearly a representative manner as possible.*

* This preliminary paper, containing the brief text to accompany the drawings, is published at this time mainly to complete the record of the year's work as a member of the Committee of Research. L. E. S.

# GELSEMIC ACID.[1]

By Virgil Coblentz.

This principle was first isolated by Professor Maisch, in 1869, later named and fully described by Professor Wormley in 1870. The latter author restricted himself to the application of various color tests and the deportment of this substance to different reagents, with the view of its identification from the standpoint of a toxicologist.

Dr. Chas. Robbins, in his work "Ueber die wesentlichen bestandtheile von Gelsemium sempervirens" (1876), describes this principle as occurring in needle-like crystals, which separate in stellate groups, possessing acid characters and forming salts with alkalies, all of these salts being insoluble in water except those of the alkalies which are readily soluble and crystalline. As regards solubilities, the same author claims that gelsemic acid is readily soluble in chloroform and ether, and soluble 1 part in 1000 of water. A number of color reactions given by Wormley were reviewed by Robbins. These will be taken up later with criticisms and comments.

The material for the following investigations was supplied by Professor J. U. Lloyd, who assured me of its purity and genuineness. The crystals were white, when viewed in mass, of a slight yellowish cast; they were of the hexagonal system and varied in length from 5 to 10 mm.[2]

The melting point of gelsemic acid, which, to my knowledge, has not been published, at least not by the above-named investigators, is 206° C. (corrected).

When heated between 110° and 115° C. for five hours in a tube, through which a currrent of dry carbonic anhydride was passed, no appreciable loss in weight occurred; in the upper portion of the tube a slight sublimate was noticeable. This may account for Dr. Robbins' two molecules of crystal water. However, the solvent employed in crystallizing may account for differences. When heated in open air gelsemic acid takes on a deep lemon-yellow color.

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[1] Read at the meeting of the American Pharmaceutical Association, 1897.

[2] Made from Gelsemium sempervirens by means of neutral solvents only, no acids or alkalies being employed. Purified by repeated crystallizations from alcohol.—J. U. L.

*Solubility.*—G. A. is soluble 1 p. in 1490 of distilled water at 30° C.

" " " 1 p. " 415 of abs. ether " 22° C.

" " " 1 p. " 135 of chloroform " 24° C.

Readily soluble in hot alcohol and glacial acetic acid.

The above figures show the average of three careful determinations each.

*Color Tests.*—The reagents employed were first tested for such impurities as might influence the color reaction.

(1) With conc. $H_2SO_4$ = pale yellow, disappears on standing.

(2) With conc. $H_2SO_4$ warmed = deep yellow.

Professor Wormley obtains a yellow to red-brown color with above.

(3) With conc. $H_2SO_4$ and trace of $HNO_3$ = blood red, quickly fades.

(4) With conc. $H_2SO_4$ and $K_2Cr_2O_7$ = to yellow, pale violet, changing to green.

Dr. Robbins obtains no reaction with 4.

(5) With conc. $H_2SO_4$ and ammonium molybdate = yellow; on standing from ten to twenty minutes = intense blue (hastened if warmed).

The reaction 5 is very delicate and characteristic.

(6) With conc. $HNO_3$ = yellow; if G. A. is in excess = reddish color; to this add $NH_4OH$ in excess = intense blood-red color.

Above test of Wormley is sensitive to 0·00002 gm.

*Reactions in Solution.*—(1) G. A. is readily soluble in diluted aqueous solutions of the caustic alkalies; the resulting solution is of a pale yellow color when viewed by transmitted light; by reflected light it exhibits an intense bluish-green fluorescence, 1 part in 1,000,000 being distinctly fluorescent. This is destroyed by addition of acids.

(2) An aqueous solution of G. A. liberates iodine from iodic acid ($HIO_3$).

(3) An aqueous solution of G. A. on addition of ferric chloride gives a green-colored solution.

(4) Lead acetate and mercuric chloride both produce, with aqueous solutions of G. A., yellowish precipitates called by Robbins "gelsemates." These precipitates proved to be a mixture of basic hydroxides of the metal and unaltered gelsemic acid, the latter being readily removed by washing with hot water or alcohol.

(5) When silver nitrate is added to an aqueous solution of G. A., at first a yellow precipitate is produced, which quickly changes to black. Solutions of auric and platinic chlorides are reduced at once.

(6) Fehling's solution, or a concentrated solution of copper sulphate, gives a brownish-red precipitate of suboxide on standing, or immediately on heating.

(7) The addition of freshly-prepared chlorine water to an aqueous solution of G. A. produces a red coloration which disappears on warming.

(8) The addition of Lugol's solution produces a brown precipitate, which consists of a mixture of free iodine and gelsemic acid.

*Analytical.*—Dr. Robbins assumes gelsemic acid to be a glucoside, after boiling its aqueous solution with diluted sulphuric acid, and heating with Fehling's solution. In the above cited reactions we find that gelsemic acid is a strong reducing agent, reacting even in cold solution, so this test is indeed, under the circumstances, fallacious.

To ascertain whether this principle is a glucoside or not, samples were boiled for twelve hours with diluted, also concentrated, hydrochloric acid, also with diluted sulphuric acid, finally; a sample was heated in a sealed tube with 5 per cent. alcoholic hydrochloric acid at 110° C. All gave negative results, the gelsemic acid remaining unchanged, and the solution failing to give any reaction for sugar with phenylhydrazine. Other sugar tests cannot be applied, because of the above-mentioned reducing properties of this principle.

Robbins as well as Wormley calls attention to the acid properties of G. A. The former states that the salts, with exception of the alkalies, are insoluble in water, while the latter are crystalline. Robbins assumes that the precipitate obtained by adding a salt of a metal to solution of G. A. was a compound of the latter with a metallic base. I have already stated that these precipitates consist of a mixture of basic hydroxides and free acid.

I endeavored to obtain salts of G. A. with the alkalies by cautiously neutralizing aqueous and alcoholic solutions of this principle with alkali carbonates and hydrates. The resulting solutions were concentrated at the lowest possible temperature, and set aside for some weeks, with the result that nothing more than amorphous crusts could be obtained.

The dry sodium salt (so-called) when heated becomes very voluminous, a phenomenon similar to the "Pharaoh's Serpent" produced on heating mercury sulphocyanide.

I next attempted to produce a salt with the alkaline earths, by boiling gelsemic acid with freshly-precipitated barium carbonate and water, also magnesium carbonate and water for several hours. The filtered solution was neutral, but upon concentrating, the carbonated alkaline earth gradually separated and the solution assumed an acid reaction. No crystals separated from the solution upon standing.

From the above it will be seen that this principle possesses very feeble acid properties and that its compounds are of an exceeding unstable character.

Attempts were made to produce salts by double decomposition between the sodium compound of G. A. in solution, with salts of the metals, but the precipitates obtained were of the same character as those mentioned under test 4.

Lassaigne's test for the presence of nitrogen was made with negative results, confirming Robbins' test.

Robbins, after making two combustions of gelsemic acid with copper oxide in a simple bayonet tube, as was customary at that time, and comparing his results with the older æsculin formula of Rochleder, comes to the conclusion that his gelsemic acid is identical with æsculin, reinforcing his opinion by comparing the fluorescent properties of both and their reducing powers on Fehling's solution. It is true that æsculin and gelsemic acid resemble each other in some particulars, such as fluorescence and reducing powers, but, as will be shown later, it will be seen that the latter is a distinctively different principle.

The two combustions of Robbins resulted as follows:

I. C = 52·04 per cent. H = 5·189 per cent.

II. C = 51·82 per cent. H = 4·98 per cent.

The older formula of Rochleder for æsculin contains C 51·57 per cent. and H 4·87 per cent.

The later accepted formula contains C 52·94 per cent. and H 4·70 per cent.

The results of Robbins' analyses and the above formula correspond quite closely. However, the author questions the accuracy of the (Robbins) analyses and the formula deduced therefrom.

The greatest difficulty was experienced in obtaining concordant

results in combustions of gelsemic acid, for this principle is one of those few organic substances which upon heating with copper oxide or oxidizing agents tends to give up only a portion of its carbon as carbon dioxide, the rest separating as a graphitic-like deposit on the sides of the combustion tube, which the highest possible temperature cannot remove. Over twenty combustions were made after various methods; in several instances, even with cupric oxide alone, two of the combustions would correspond quite closely, but subsequent results did not justify that any reliance be placed upon the figures. The various methods employed were: First, combustion with copper oxide in a bayonet tube; second, with cupric oxide in an open tube in a current of oxygen; in the third method, lead chromate was employed; the fourth method attempted consisted in mixing the gelsemic acid with powdered fused potassium bichromate in a platinum boat, and then burning in an open tube into cupric oxide in a current of oxygen; as fifth attempt, the method of wet combustion with a mixture of chromic anhydride and sulphuric acid was attempted, passing the gases through a spiral cooler, then over lead peroxide to remove sulphur dioxide, finally over calcium chloride, into the potash absorption apparatus (see AMERICAN JOURNAL OF PHARMACY, May, 1897, p. 228). This method, although requiring the greatest care to prevent the contaminating gases from passing over, gave very good results in the analysis of some of the derivatives of gelsemic acid, while with the mother-substance discordant results were obtained. Finally, as last resort, a mixture of lead chromate 3 parts and red lead (mennige) 1 part was tried, the combustion being carried on in an open tube in a current of oxygen. The two above-mentioned ingredients were reduced to a fine powder, well mixed, moistened with water, granulated and sharply dried at 150° C. This mixture was introduced into an open combustion tube and heated to dull redness in a current of oxygen, then on cooling the well-dried sample of gelsemic acid, which had previously been mixed with an ignited mixture of equal parts of powdered lead chromate and lead oxide, was introduced, and the combustion carried on slowly in a current of oxygen, bringing the tube finally to a bright red heat. No traces of separated carbon could be found on the sides of the tube after combustion.

The analyses resulted as follows:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| I. 0·2432 | gramme | substance | yielded | 0·5582 | gramme | of $CO_2$=62·59 | per cent. | C. |
| " | " | " | " | 0·0988 | " | " $H_2O$= 4·51 | " " | H. |
| II. 0·1140 | " | " | " | 0·2610 | " | " $CO_2$=62·45 | " " | C. |
| " | " | " | " | 0·0470 | " | " $H_2O$= 4·58 | " " | H. |
| III. 0·2926 | " | " | " | 0·6739 | " | " $CO_2$=62·81 | " " | C. |
| " | " | " | " | 0·1166 | " | " $H_2O$= 4·42 | " " | H. |

From the average of the above analyses the formula $C_{13}H_{11}O_5$ was deduced, the percentage of carbon would be 63·16 and of hydrogen 4·45. Thus for comparison:

| Calculated. | Found = I. | II. | III. |
|---|---|---|---|
| C = 63·16 | 62·59 | 62·44 | 62·81 |
| H = 4·45 | 4·51 | 4·58 | 4·42 |

A molecular weight determination (which would be of great assistance here), after the method of Beckmann (kryoscopic), was found impossible because of the insolubility of gelsemic acid in the cold solvents employed in these determinations, with the exception of phenol, which, however, gave abnormal results, due probably to molecular action between the two.

*Action of Phosphorus Pentachloride.*—Gelsemic acid was cautiously fused with a slight excess of phosphorus pentachloride; to the mass water was added slowly, the tube being kept well cooled with ice. After standing a few hours a white mass separated, which, after thoroughly washing, was taken up into as little hot alcohol as possible, filtered and again precipitated in an excess of water. This operation was repeated several times in order to remove a non-crystallizable impurity which was comparatively insoluble in alcohol; finally the product was recrystallized twice from alcohol. This chloro-derivative of gelsemic acid melts at 190° C. A chlorine estimation was made after Carius. 0·0615 gramme of substance yielded 0·0616 gramme of AgCl, which corresponds to 24·76 per cent. of chlorine. The theoretical replacement of *two* hydroxyl groups by chlorine would give us 25 per cent. of the latter. This proves conclusively that we have replaceable hydroxyl groups present.

Thus,

$$C_{13}H_9\,(OH)_2O_3 = C_{13}H_9\,(Cl)_2O_3.$$

Calculated, Cl = 25 per cent. Found Cl = 24·76 per cent.

*Action of Acetic Anhydride.*—Gelsemic acid was heated with acetic anhydride and anhydrous sodium acetate in a flask with reflux

condenser for several hours, then the reaction's product was poured into an excess of water, the precipitate formed thoroughly washed, dried and crystallized from alcohol. This compound forms needle-like anhydrous crystals, which melt at 180° C. The number of acetyl groups ($C_2H_3O$) entering this compound was determined by saponifying a weighed quantity in an excess of normal alcoholic potassium hydrate, and then titrating back the excess of alkali by means of standard hydrochloric acid. Assuming that the two hydrogen atoms of the hydroxyl groups have been replaced by two acetyl radicals, we have the following:

| | | |
|---|---|---|
| $C_{13}H_9(C_2H_3O)_2O_5$, calculated percentage of $(C_2H_3O)_2$. | | Found. |
| | 25·98 | 25·14 |

On adding bromine to a hot solution of gelsemic acid in glacial acetic acid a voluminous white precipitate formed, which, when crystallized from alcohol, formed yellow needles which fused at 250° C. A further investigation of this body was postponed for lack of material.

Thus far, from the above results, we may ascribe to gelsemic acid the formula $C_{13}H_9O_3(OH)_2$. Considering the active reducing character of this principle it is highly probable that either an aldehyde or a ketone group is also present, which further investigation will determine. That gelsemic acid is identical to æsculin, as Robbins and others have assumed (disputed by Wormley), is not possible, as the comparisons and criticisms of the combustions already given have shown. In addition to this, further comparisons are given below. It may be possible that a relationship in certain groupings exists between these two principles, which, however, cannot be settled as yet.[3]

[3] "About fifteen years ago I prepared for and presented Professor Flückiger with a quantity of pure white crystallized gelsemic acid. Professor Flückiger became much interested in its chemistry and personally prepared some æsculin to compare therewith. He determined that they were different bodies, advising me of the fact by letter, stating that he would continue the investigation, in which he was deeply interested. The subject, however, rests among his uncompleted works, and, so far as I know, he did not publish his results."—From a personal letter from John Uri Lloyd, dated August 16, 1897, after this paper was written.

| Æsculin. | Gelsemic Acid. |
|---|---|
| $C_{15}H_{16}O_9 + 1\frac{1}{2}H_2O$— melts at 160° C. | $C_{13}H_{11}O_5$ — melts at 206° C. |
| Forms a penta-acetyl derivative, melts at 203°–206° C. | Forms a diacetyl derivative, melts at 180° C. |
| Splits up into sugar and æsculetin. | Does not hydrolyze. |
| Bromine derivative melts 193°–195° C. | Bromine derivative melts 250° C. |
| Chloro subst. prod. not prepared. | Chloro subst. prod. melts 190° C. |

The author desires to express his thanks to Prof. Dr. A. Hilger (Munich), for valuable advice given during a portion of the above investigations.

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## ALKANET ROOT.[1]

By E. M. Holmes, F.L.S.

Although alkanet was known as a drug to Theophrastus, Dioscorides, and Pliny,[2] and similar roots have been used in the East for centuries, comparatively little is to be found concerning the drug in modern text-books on Materia Medica, notwithstanding the fact that there are probably few pharmacists who do not keep the root in stock. The plant is not described either in Pereira's "Materia Medica," or in "Pharmacographia," nor is any figure of the plant to be found in Bentley and Trimen's or other English works on medicinal plants. In Woodville's "Medicinal Plants" (Vol. II, third ed., plate 106) the drug is referred to Anchusa tinctoria, but the figure given is that of A. officinalis, L. (*vide Index Kewensis*, I, p. 119), which does not yield a red root. The author, indeed, remarks (*l. c.*, p. 315): "In this climate its roots never acquire the deep color on which its utility depends." The only good figure that I have seen of Alkanna tinctoria, Tausch, the plant which is the chief source of the alkanet root of commerce, is given by Berg in "Offizin. Gewächse" (plate xxiv, c).

I have never seen the plant cultivated in botanic gardens in this country, and for some years I have endeavored to obtain the plant, which is a native of the south of Europe, through pharmacognosists in Austria, but without result. At the commencement of this year I saw the plant mentioned in the seed list of the Botanic Garden of Montpellier, and, on writing for some, was informed that the demand for the seeds had been so great that the stock was exhausted. Professor L. Planchon, however, was good enough to send me several

[1] *Pharmaceutical Journal*, July 24, 1897.

[2] "Pharmacographia Indica," Vol. II, p. 524.

roots, so that I have been able to study the habits of the plant. The literature on the subject being so scanty, and the plant itself apparently so rare in cultivation, I have thought that a few observations on the plant under cultivation in this country might prove of interest to some of the readers of this JOURNAL. The roots, which arrived in March, had scarcely any rootlets, and Professor Planchon doubted whether they would grow. But as they had only a few


1. Whole plant. About one-third natural size. 2. Corolla, magnified, showing relation of stamens to indentations in throat of corolla.

leafy shoots at the crown, and had scarcely started growth, I had some hopes of success. Having learned from him that the plant grows in sandy fields amongst grass, fully exposed to the sun, the sandy soil probably containing calcareous matter derived from shells, I planted some in full exposure to sunlight, and others in a position where they would only get the morning sun and be some-

what sheltered from cold winds, two others being placed in pots in a cool greenhouse. The soil used was a mixture of grassy loam and "hassocks,"[3] broken down into sandy grit by frost. The two specimens fully exposed to the sun, although covered during windy days and frosty nights, succumbed by reason of the dryness of the soil. Those exposed only to the morning sun and sheltered by stones and herbage from cold winds progressed slowly, but ultimately flowered freely, vigorous growth occurring only as the air became warmer. Those in the greenhouse quickly made a start and flowered before those in the open ground had made flowering shoots. The crown of the root sends up several slender leafy shoots, which are at first prostrate or decumbent, but become gradually ascending, and when elongated and in flower, they are nearly erect from a decumbent base. Besides these there are at the same time a few shoots which do not develop flowers.

The plants evidently require a warmer atmosphere than is usual in an English spring, and will not thrive in the open air except in sheltered warm situations. The flowers are about the size of those of Anchusa sempervirens, but of a more beautiful ultramarine blue color. They have no scales in the throat of the corolla, differing in this particular from the genus Anchusa, but the tube of the corolla has, on the external surface, two rows of indentations, which cause a slight bulging of the corolla between the brown anthers. These have very short filaments, three of the anthers being situated above the upper row of indentations, and two above the lower row, and the throat of the corolla is lined with minute glandular hairs. The stigma in the flowers I have examined is on a level with the two lower stamens. This may possibly be an arrangement to provide self-fertilization in case the flowers are not cross-fertilized, or it may be a special adaptation to direct a particular insect to the honey which lines the corolla tube. The leaves are of a slightly grayish-green tint and are covered with hispid hairs and very short stalked glands, the latter being visible only under a good lens. The accompanying figure represents the plant of one-third the natural size, as grown in a pot in this country, though possibly smaller than the wild plant as occurring in the warmer climate of Montpellier.

[3] "Hassocks" is a local name for the soft layers of stone found between layers of Kentish ragstone in the green sand formation, but which, unlike the ragstone, split up and become pulverized by the action of frost, forming excellent soil for rockeries.

In "Les Drogues Simples" MM. Planchon and Collin state that several other boraginaceous plants have red roots and can be substituted for alkanet, such as Onosma echioides, L. (S. Europe), Arnebia tinctoria, Vahl. (Egypt and Arabia). According to "Pharmacographia Indica," II, p. 524, four kinds of alkanet are described by Mohammedan writers, Harjuya being the Persian, and Ratanjot the Indian name for the drug. It is also stated that the roots of Onosma hookeri, C. B. Clarke, and of a species of Arnebia from Afghanistan, are known as Rang-i-badshah (*i. e.*, royal dye) and Ratanjot, and that a third kind is imported from China, and consists of long, woody, twisted roots, like the alkanet of Europe.

In the Hanbury collection of materia medica there is a specimen of a root resembling alkanet in color, but having a thin, laminated, papyraceous bark like the tunic of a bulb. It was received from Dr. Stocks, and has the native name of Maharrunga, and is referred to Lithospermum euchroma, Royle, which is identified in the Kew Index as Macrotomia perennis, Benth.

Specimens exist in the herbarium of the society, of Macrotomia benthami, D. C., and of Onosma echioides, Linn., both of which have roots of a deep purple color, and a laminated bark. In the former the laminæ are faintly reticulated, and in the latter wrinkled transversely. Both would at once be recognized in commerce as alkanet, but different from the European drug.

In Watts' "Dictionary of the Economic Products of India" (I, p. 318), Arnebia thibetana, Kurz, is stated, on Dr. J. E. T. Aitchison's authority, to have a scaly root bark, and to be used as dye. The roots of Onosma emodi, Wall., and O. hookeri, Clarke, are also said to yield a red dye (*l. c.*, p. 488). Whether any of these are superior in tinctorial power to European alkanet or not, might perhaps be worthy of inquiry. O. hookeri is said to yield the best Lepcha red dye ("Flora British India," IV, p. 178) The root is used as a red dye for wool, a vegetable acid, such as that of apricots, being employed for the purpose of giving the desired tint. An alkanet root from Japan is referred to Lithospermum erythrorhizon. The plants of which the roots are known to be used like alkanet are therefore as follows: Alkanna tinctoria, Tausch; Arnebia thibetana, Kurz; Arnebia tinctoria, Vahl.; Lithospermum erythrorhizon; Macrotomia benthami, D. C.; Macrotomia perennis, Benth.; Onosma emodi, Wall.; and Onosma hookeri, Clarke.

# THE ACTIVE PRINCIPLE OF DIGITALIS.[1]

By C. C. Keller.[2]

The unsatisfactory results obtained with the digitalin prepared according to the method described by Kiliani[3] have again directed attention to digitoxin, which is, according to Schmiedeberg, the most potent constituent of digitalis leaves, and forms the chief part of Nativelle's digitalin. On that account C. C. Keller has devised a method of determining the efficacy of digitalis preparations by ascertaining the amount of digitoxin present in them.

The chief characters of digitoxin, which are of importance in this connection, are its free solubility in alcohol and chloroform, slight solubility in ether, and its insolubility in petroleum spirit. It is precipitated from solutions in water or dilute alcohol by tannin but not by basic lead acetate. From acid or alkaline water solutions it can be extracted by shaking with chloroform. Although pure digitoxin is almost insoluble in water, it is dissolved to some extent in the presence of extractive materials, and the other glucosides of digitalis. Digitonin and digitalin are almost insoluble in chloroform.

To ascertain the amount of digitoxin in digitalis leaves they must first be extracted with 70 per cent. alcohol, preferably by percolation, which must be continued until the residue from 3 or 4 cubic centimetres, redissolved in water with 2 drops of dilute hydrochloric acid, gives, after filtration, no appreciable turbidity on the addition of tannin.

The residue of the extract, from which alcohol has been removed by evaporation, is mixed with water, washed into a beaker of about 250 c.c. capacity, diluted to the volume of 222 c.c., and mixed with basic lead acetate. The very voluminous precipitate is separated by filtration, and excess of lead removed from the filtrate by adding sodium sulphate. The clear liquid is then mixed with 2 c.c. ammonia solution (10 per cent.) and shaken four or five times with about 30 c.c. of chloroform. The clear chloroform solution evaporated gives the digitoxin mixed with some fat and other substances. For purification the residue is dissolved in 3 c.c. chloroform, 7 c.c.

[1] *Pharmaceutical Journal*, July 24, 1897.

[2] *Berichte deutsch. pharm. Gesellsch.*, VII, 1.5.

[3] See *Phar. Jour.*, LV, 29.

ether, and 50 c.c. petroleum spirit added. The digitoxin then separates in white flocks, and on shaking, the liquid becomes quite clear. For weighing the digitoxin it may be dissolved off the filter with hot alcohol and the solution evaporated in a suitable vessel, or the petroleum spirit may be decanted off and the digitoxin weighed in the state of powder.

Digitoxin thus obtained dissolves in strong hydrochloric acid with a yellowish color, and the solution when warmed becomes greenish, then greenish-brown; on adding water the color becomes greenish-yellow, and after some time flocks are separated.

A solution of digitoxin in glacial acetic acid containing ferric chloride, gives Keller's reaction when floated on strong sulphuric acid. At the line of contact a dark zone appears, and after a few minutes the acetic acid liquor becomes dark blue. This reaction takes place with one-tenth of a milligramme of digitoxin in 1 c.c. of acetic acid.

The complete separation of digitalin is difficult, as it is sufficiently soluble in chloroform for traces to be taken up, and to that circumstance must be ascribed the red coloration of digitoxin when mixed with strong sulphuric acid.

The watery liquid from which digitoxin has been extracted by shaking with chloroform has a bitter taste and contains digitonin, which can be separated by precipitation with tannin; but as it does not possess the peculiar efficacy of digitalis, its separation is of little importance. Keller was unable to obtain any substance corresponding to the description of digitalein, and he considers it is merely digitonin mixed with traces of digitoxin and digitalin.

After separating digitonin tannate, the filtered liquid still contains digitalin.

The general conclusion arrived at by Keller is that digitalis leaves contain digitoxin, digitonin and digitalin identical with the products from digitalis seeds, but in somewhat different proportions, the amount of digitoxin in the seeds being much smaller than that in good leaves, but it varies very much in different samples of leaves, or from 0·26 to 0·62 per cent. A still greater variation was found in the pharmaceutical preparations of digitalis, and Keller strongly recommends the adoption of means for ascertaining the medicinal value of the drug on the basis of the amount of digitoxin it contains.

# THE BOTANICAL GARDEN AT BUITENZORG.

The following description of the famous Buitenzorg Botanical Garden in Java, is taken from an article entitled "Down to Java," by Eliza Ruhamah Scidmore, in the *Century Magazine* for August, 1897, and which is part of a book to be entitled "Java: the Equatorial Eden," to be issued by the Century Company in November.

The famous botanical garden at Buitenzorg is the great show-place, the paradise and pride of the islands. The Dutch are admitted to be the best horticulturists of Europe, and with the heat of a tropical sun, a daily shower, and a century's well-directed efforts, they have made Buitenzorg's garden first of its kind in the world, despite the rival efforts of the French at Saigon, and of the British in Singapore, Ceylon, Calcutta and Jamaica. The Governor-General's palace is in the midst of a ninety-acre inclosure, reached from the main gate near the hotel by what is undoubtedly the finest avenue of trees in the world. These graceful kanari trees, arching 100 feet overhead in a great green cathedral aisle, have tall, straight trunks, covered with stag-horn ferns, bird's-nest ferns, ratans, creeping palms, blooming orchids, and every kind of parasite and air-plant the climate allows; and there is a fairy lake of lotus and *Victoria regia* beside it, with pandanus and red-stemmed Banka palms crowded in a great sheaf or bouquet on a tiny islet. When one rides through this green avenue in the dewy freshness of the early morning, it seems as though nature and the tropics could do no more, until he has penetrated the tunnels of waringen trees, the open avenues of royal palms, the great plantation of a thousand palms, the grove of tree-fern, and the frangipani thicket, and has reached the knoll commanding a view of the double summit of Gedeh and Pangerango, vaporous blue volcanic heights, from one peak of which a faint streamer of smoke perpetually floats.

There is a broad lawn at the front of the palace, shaded with great waringen, sausage and candle trees, and trees the branches of which are hidden in a mantle of vivid-leafed bougainvillea vines, with deer wandering and grouping themselves in as correct park pictures as if under branches of elm or oak, or beside the conventional ivied trunks of the North.

It is a tropical experience to reverse an umbrella and in a few minutes fill it with golden-hearted frangipani blossoms, or to find nutmegs lying as thick as acorns on the ground, and break their

green outer shell and see the fine coral branches of mace enveloping the dark kernel. It is a delight, too, to see mangosteens and rambutans growing, to find bread, sausages and candles hanging in plenty from benevolent trees, and other fruits and strange flowers springing from a tree's trunk instead of from its branches. There are thick groves and regular avenues of the waringen, a species of Ficus, and related to the banian—and the rubber tree, a whole family, the roots of which writhe over the ground, drop from the branches, and generally comfort themselves in unconventional ways. Bamboos grow in clumps and thickets, ranging from the fine feathery-leafed canes that are really only large grasses, up to the noble giants from Burma, the stems of which are solid trunks easily soaring to 100 feet in air, and spreading there a solid canopy of graceful foliage.

The creepers run from tree to tree, and writhe over the ground like gray serpents; ratans and climbing palms 100 feet in length are common, while uncommon ones stretch to 500 feet. There is one creeper with a blossom like a magnified white violet, and with all a wood-violet's fragrance; but with only Dutch and botanical names on the labels, one wanders ignorantly and protestingly in this paradise of strange things. The rarer orchids are grown in matted sheds in the shade of tall trees; and although it was then the end of the dry season, and few plants were in bloom, there was an attractive orchid show, in which the strangest and most conspicuous bloom was a great butterfly flower, or pitcher plant, the pale-green petals of which were veined with velvety maroon, and half concealed the pelican pouch of a pitcher filled with water. It was an evil-looking, ill-smelling, sticky thing, and its unusual size and striking colors made it haunt one longest of all the vegetable marvels. There were other more attractive butterflies fluttering on pliant stems, strange little woolly white orchids, like edelweiss transplanted, and scores of delicate Java and Borneo orchids, not so well known as the Venezuelan and Central American orchids commonly grown in American hothouses, and so impossible to acclimate in Java.

Lady Raffles died while Sir Stamford was governor of Java, and was buried in the section of the palace park that was afterward set apart as a botanical garden, and the care of the little Greek temple over her grave near the kanari avenue was provided for in a special

clause in the treaty of cession. The bust of Theismann, who founded the garden and added so much to botanical knowledge by his studies in Java and Borneo, stands in an oval pleasance called the rose garden; and there one may take heart and boast of the temperate zone, since that rare exotic, the rose, is but a spindling bush, and its blossoming less than scanty at Buitenzorg, when one remembers California's perennial prodigalities in showers of roses. After the death of the learned curator, Dr. Treub, in 1895, Professor Lotsy, of Johns Hopkins University, Baltimore, was called to the charge of this famous garden, which provides laboratory and working space for, and invites foreign botanists freely to avail themselves of this unique opportunity of study. Over one hundred native gardeners tend and care for this great botanic museum of more than nine thousand living specimens, all working under the direction of a white head gardener. The Tjilewong River separates the botanic garden from a culture-garden of forty acres, where seventy more gardeners look to the economic plants—the various cinchonas, sugar-canes, rubber, tea, coffee, gums, spices, hemp and other growths, the introduction of which has so benefited the planters of the colony. Experiments in acclimatization are carried on in the culture-garden, and at a mountain garden high up on the slopes of Salak, where the Governor-General has a third palace, and where there is a Government hospital and sanitarium.

All Java is, in a way, as finished as little Holland itself, the whole island being cultivated from edge to edge like a tulip garden, and connected throughout its length with post-roads, as smooth and perfect as park drives, all arched with waringen, kanari, tamarind or teak trees. The rank and tangled jungle is invisible save by long journeys, and great snakes, wild tigers and rhinoceroses are almost unknown now. One must go to Borneo and the farther islands to see them. All the valleys, plains and hillsides are planted in formal rows, hedged, terraced, banked, drained and as carefully weeded as a flower bed. The drives are of endless beauty, whichever way one turns from Buitenzorg, and we made triumphal progresses through the kanari- and waringen-lined streets in an enormous "milord." The equipage measured all of 20 feet from the tip of the pole to the footman's perch behind, and with a cracking whip and at a rattling gait we dashed through shady roads, past Dutch barracks and hospitals, over picturesque bridges, and through

villages where the native children jumped and clapped their hands with glee as the great Juggernaut vehicle rolled by. We visited the grave of Radin Saleh, a lonely little pavilion or temple in a tangle of shrubbery that was once a lovely garden shaded by tall cocoa-palms; and we drove to Batoe Toelis, "the place of the written stone," and in the little thatched basket of a temple saw the sacred stone inscribed in ancient Kawi characters, the original classic language of the Javanese. In another basket of a shrine we were shown the veritable foot-prints of Buddha, with no explanation as to how and when he rested on the island, nor yet how he happened to have such long, distinctively Malay toes. Near these temples is the villa where the poor African prince of Ashantee was so long detained in exile—an African chief whose European education had turned his mind to geology and natural sciences, and who led the life of a quiet student here until, by the change of Ashantee from Dutch to British ownership, a way was opened for him to return to and die in his own country. There is a magnificent view from the Ashantee villa out over a great green plain and a valley of palms to the peaks of Gedeh and Pangerango, and to their volcanic neighbor, Salak, silent for 200 years. Peasants, trooping along the valley roads far below, made use of a picturesque bamboo bridge that is accounted one of the famous sights of the neighborhood, and seemed but processions of ants crossing a spider's web. All the suburban roads are so many botanical exhibitions approaching that in the great garden, and one's interest is claimed at every yard and turn.

It takes a little time for the temperate mind to accept the palm-tree as a common, natural and inevitable object in every outlook and landscape; to realize that the joyous, living thing with restless, perpetually thrashing foliage is the same correct, symmetrical, motionless feather-duster on end that one knows in the still life of hot-houses and drawing-rooms at home; to realize that it grows in the ground, and not in a pot or tub to be brought indoors for the winter season. The arches of gigantic kanari trees growing over by-lanes and village paths, although intended for triumphal avenues and palace driveways, overpower one with the mad extravagance, the reckless waste and the splendid luxury of nature. The poorest may have his hedge of lantana, which, brought from the Mauritius by Lady Raffles, now borders roads, gardens and the railway tracks

from end to end of the island. The humblest dooryard may be gay with tall poinsettia trees, and bougainvilleas may pour a torrent of magenta leaves from every tree, wall or roof. The houses of the rich planters about Buitenzorg are ideal homes in the tropics, and the Tjomson and other great tea and coffee estates are like parks. The drives through their grounds show one the most perfect lawns and flower beds and ornamental trees, vines and palms, and such ranks on ranks of thriving tea bushes and coffee bushes, every leaf perfect and without flaw, every plant in line, and the warm, red earth lying loosely on their roots, that one feels as if in some ornamental *jardin d'acclimatation*, rather than among the most staple and serious crops of commerce. Yet from end to end of the island the cultivation is as intense and careful, entitling Java to its distinction as "the finest tropical island in the world." It is the gem of the Indies, the one splendid jewel in the Netherlands' crown, and a possession to which poor Cuba, although corresponding exactly to it geographically and politically, has been vainly compared.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Incompatibilities in Prescriptions. For students in pharmacy and medicine and practicing pharmacists and physicians. By Edsel A. Ruddiman, Ph.M., M.D., Adjunct Professor of Pharmacy and Materia Medica in Vanderbilt University. First edition, first thousand. New York: John Wiley & Sons. London: Chapman & Hall, Ltd. 1897.

Part I treats of incompatibilities, taking up the various substances in alphabetical order, beginning with acacia and ending with zinc.

Each substance has its behavior towards the various pharmaceutical and chemical reagents described briefly, and with this information the physician or pharmacist is supposed to be able to decide on the incompatibilities of the substance he proposes to put into a prescription. In most cases of official substances, he would do better to consult the U. S. Pharmacopœia, where he would find tests that will almost always give a clue to the incompatibilities without being obscured by a large number of tests and properties which are of doubtful value when true, and which, in many cases, are not true.

It appears to us that Part I is top-heavy with quotations from Muir and Morley's edition of Watts' Dictionary. This is just about the last authority we should have thought of consulting on a pharmaceutical subject. For instance, of what value is it to one compounding a prescription to know that morphine is oxidized by an alkaline solution of potassium permanganate, forming an acid; or that potassium ferricyanide oxidizes morphine to pseudo-morphine, when the conditions necessary for the reactions are such as are not liable ever to occur in compounding prescriptions?

The author has succeeded much better when he has quoted Allen or Prescott.

What is needed, in a list of properties of such substances as occur in Part I, is not a compilation of tests which are worn threadbare from having done long service in text-books, but a list of such as have been tried by the author himself, and which he can vouch for.

Part II is devoted to the criticism of 325 prescriptions. In it the author has succeeded in presenting what will be of value for the student to study, but it is scarcely possible that one would find, while compounding a prescription, an example in the 325 that would correspond to that which he has in hand. The information in Part II is valuable, especially that given in tabular form, showing the effect of rubbing together equal weights of two solids, and for this concise statement the author deserves much credit.

Accidents and Emergencies. A manual of the treatment of surgical and medical emergencies in the absence of a physician. By Chas. W. Dulles, M. D., Fellow of the College of Physicians of Philadelphia and of the Academy of Surgery, etc., etc. Fifth edition. Philadelphia: P. Blakiston, Son & Co. 1897.

In these days, when students of pharmacy are instructed concerning emergencies, a new edition of this work will be especially acceptable.

The style of the writer is so concise and attractive that one follows the subject with but little effort. Every class of accident appears to be fully considered, and the text so elucidated by illustrations as to make the method of procedure in an emergency case easily learned as well as easily remembered.

The only adverse criticism we have to make is in the chapter devoted to "Description of Poisonous Plants," where the author appears to be out of his element. Poke root is given as the leading common name of Veratrum viride, and the illustration of the latter is given the title "poke root." If the author has ever found any authority for the application of the name poke root to Veratrum viride, he has seen an error that it is unfortunate to propagate. We are aware that the term Indian poke has been applied to Veratrum, but not poke root. The so-called wild parsnip, Pastinaca sativa, had better have been omitted from the book altogether, for it has been shown time and again that the parsnip, whether wild or cultivated, is not poisonous. The numerous cases of poison cited in the newspapers as caused by wild parsnip, have in most instances been caused by Cicuta maculata. Some typographical errors are noticeable in this chapter, indicating that it did not receive quite the care at the hands of the author that it should, although the subject is one of the most important of those treated, and it might be made one of the most interesting. It is to be hoped that it will be re-written for the next edition.

Bulletin Vol. III, No. 3, of the College of Agriculture, Imperial University, Japan.

Although issued by a department of agriculture, many of the subjects treated are of especial interest to pharmacists, as shown by the following list of titles and authors contained in the current issue: "The Chemistry of Soja Sauce Manufacture," by Y. Nishimura; "Contributions to the Chemistry of Sake Brewing," by J. Okumura; "On the Origin of Sake Yeast (Saccharomyces Sake)," by K. Yabe; "Note on a Grape Wine Fermented by Sake Yeast," by K. Negami; "On the Behavior of Yeast at a High Temperature," by T. Nakamura; "On Two New Kinds of Red Yeast," by K. Yabe; "On Bromalbumin and Its Behavior to Microbes," by O. Loew and S. Takabayashi; "On

an Important Function of Leaves," by U. Suzuki; "On the Behavior of Active Albumin as a Reserve Material during Winter and Spring," by U. Suzuki; "On the Physiological Action of Neutral Sodium Sulphite upon Phænogams," by K. Negami; "On the Poisonous Action of Ammonium Salts upon Plants," by S. Takabayashi; "The State of Cane Sugar Manufacture in Formosa," by N. Yamasaki.

The Japanese are a progressive people, and especially are they ahead of the rest of the world in the matter of the application of ferments to the preparation of vegetable food. In the soja bean they have, by preliminary treatment, made available a nitrogenous and fatty food which largely answers the purposes of animal food. We could learn many valuable lessons from them on this subject.

SOME COMMON POISONOUS PLANTS. By V. K. Chestnut. Reprint from the Year Book of the Department of Agriculture for 1896.

The following plants have been considered: Poison Ivy, and the other poisonous members of the genus Rhus; Cicuta maculata, or the American Water Hemlock, and the Death Cup, Amanita phalloides; some other members of the Amanita family have also received attention. We are pleased to note that the author not only considers the chemistry of the poisonous principle of poison ivy settled, but he also recommends a remedy which in his hands has produced excellent results. He agrees with Pfaff that the active principle is a fixed oil (toxicodendrol). Acting on this foundation he considers that alkalies render it inert, but he has more easily obtained this result by alcoholic solution of lead acetate. The solution of sugar of lead in strong alcohol is, on account of the solvent, too irritating; therefore, he proposes a saturated solution of the lead salt in 50 to 75 per cent. alcohol. "The milky fluid should then be well rubbed into the affected skin, and the operation repeated several times during the course of a few days. The itching is at once relieved and further progress of the malady is checked. The remedy has been tried in a large number of cases and has always proved successful."

We hope the author is right and that all the superstition and mystery which have surrounded this plant for centuries have been dissipated forever; but before committing ourselves too fully, we want to hear from some of the numerous victims of the plant who can produce abundant evidence that they have been poisoned by it without contact.

The report is written in a clear, concise style, free from technicalities, and cannot but be of service to all those who will study it carefully. The author will do well to continue his researches and reports on this subject.

PROCEEDINGS OF THE FLORIDA STATE PHARMACEUTICAL ASSOCIATION, at its tenth annual meeting, held at Jacksonville, Florida, May 22, 23, 1896.

Although late in appearing, this issue indicates creditable work by the pharmacists of Florida. Two papers were read with the following suggestive titles: "New Facts Staring Us in the Face," by H. L. Irwin; and "The 'Drug Business' is a Very Interesting Profession, but a Very Poor Business," by S. P. Fries. Both papers picture the demoralization caused by cutting of prices, and recommend organization of a manufacturing company by the pharmacists of the State.

# BRITISH PHARMACEUTICAL CONFERENCE.

The thirty-fourth annual meeting of the British Pharmaceutical Conference was held at Glasgow, Scotland, August 9 to 11, 1897. For the following information concerning the proceedings, we are indebted to the *Pharmaceutical Journal* and the *Chemist and Druggist* in their issues of August 14th.

The sessions of the Conference proper were begun with the official address of welcome on the part of the city authorities. The president then referred to the presence of Prof. J. P. Remington of Philadelphia, and Mr. Champion, President of the Pharmaceutical Society of Natal, who were introduced and asked to make some remarks.

Following this came the address of the President, Charles Symes, Ph.D. In opening his address Dr. Symes said that during the celebration of the Diamond Jubilee of the Queen retrospective views had been taken of the growth and progress of science, art, literature, professions and commerce, during her reign. He said that "the tendency in the present rapidly progressive age is to rush forward at a pace which leaves little opportunity for reflection, for looking back on the experiences of the past and endeavoring to find therein some solution of the difficulties which beset us in the present, or suggestions to assist us in developments for the future." He, therefore, felt that the occasion was one on which an historical account of the association would harmonize with their environment. The origin of the society, together with the objects had in view by the founders, was first described, after which the salient features of the annual addresses of all the presidents were presented as best showing the progress made since its establishment, in 1863.

Having concluded this part of his address, the President then considered some of the questions with which British pharmacists are concerned at the present time. In the matter of education and examination he thought that the standard for the preliminary or arts examination was too low, while that of the minor or qualifying examination, which cannot be taken for five or six years after the first, was too stringent, and that an intermediate examination in two or three years after the preliminary would be an advantage.

The new forthcoming British Pharmacopœia was referred to and the speaker regretted that "pharmacists have not yet been accorded the position which justice demands that they should possess as members of the Pharmacopœia Committee. The Pharmacopœia is a pharmaceutical and not a medical work and yet no pharmacist has any legal standing or position other than that accorded by courtesy."

The speaker said that the Medicine Stamp Act appeared to be an impediment to trade in some instances, while on the whole, he thought, it would be found to be a friend in disguise. His attention had been directed to some of the evils which would follow its repeal, could this be obtained, and the exemption clauses in one of its provisions were looked upon by him as "a distinct recognition of our calling as a responsible profession."

The Pharmacy Act of 1868 was a disappointment in certain respects. As a body, pharmacists were better educated, but the titles which they thought had been so thoroughly and completely safeguarded, whilst denied to unqualified individuals, could be used by stores with impunity.

Competition, piracy and the practice by physicians of accepting ready-made

formulæ introduced to them by the agents of advertising manufacturers, each received a share of attention from the speaker, and in concluding his remarks on this subject he said: "Meanwhile, it is not the duty of the pharmacist to stand still and wait, not to devote his energy and ability to pharmaceutical quackery, but by integrity, legitimate enterprise and earnest scientific work to raise the standard of his calling and thus facilitate the acceptance by the medical profession of a state of things in which he will reap the reward of his labors, and both professions will be accorded an enhanced amount of confidence and respect by the public."

The presidential address occupied just one hour in its delivery, after which was the reception of delegates, the reports of the Executive Committee and Treasurer, and Unofficial Formulary Committee.

The preliminary exercises having been concluded, the reading and discussion of papers next occupied the attention of the Conference.

The first paper presented was a

## NOTE ON THE WORD "ASAFETIDA."

By John Attfield.

Having been called upon to give an authoritative opinion as to the correct spelling of this word, the author consulted eminent philologists with the result that both the Latin and English spelling of the word should be "asafetida."

## FURTHER NOTE ON THE PHARMACY OF CONIUM MACULATUM

By E. H. Farr and R. Wright.

The question which the authors undertook to solve was whether the action of a standard solution of conine or of the mixed alkaloids of conium was similar to that of a standardized galenical preparation of the same alkaloidal value. The following were prepared for making physiological tests: (1) a fluid extract of dried, unripe fruits, standardized to contain 2·5 per cent. of total alkaloidal hydrochlorides; (2) a corresponding solution of the mixed alkaloids of the same fruits of the same strength; (3) succus fruct. conii assaying 0·7 per cent. total alkaloidal hydrochlorides; (4) a solution of pure conine hydrochloride; (5) solution of conhydrine hydrochloride; (6) solution of pseudo-conhydrine hydrochloride.

These were reported on in the following paper:

## PRELIMINARY NOTE ON THE ACTION OF CERTAIN PREPARATIONS AND ACTIVE PRINCIPLES OF CONIUM MACULATUM.

By Wm. Findlay.

The author found that conine and the mixed alkaloids were the most toxic, the lethal dose being, for conine, 37 milligrammes per kilo body-weight; for the mixed alkaloids, 39 milligrammes; for conhydrine, not less than 257 milligrammes, and pseudo-conhydrine above that quantity. The results obtained with the fluid extract were not sufficiently exact for tabulation, although it was as active on frogs as conine. The succus could not be compared with the other preparations owing to its low percentage of alkaloids.

## SOME OBSERVATIONS ON ORGANOTHERAPY.

By J. C. McWalter.

The writer referred to the serious symptoms which sometimes follow the administration of the tablets prepared from various animal glands, and which,

he believed, were due to poisonous properties developed on exposure to air. He strongly condemned this mode of administration, and suggested a preparation made by dialysis of a glycerin (sterilized) extract of the fresh glands as probably being the best.

## FURTHER OBSERVATIONS ON COMMERCIAL OIL OF CITRONELLA.

By John C. Umney and R. S. Swinton.

The object had in view by the authors in this investigation was to determine whether the differences observed to exist between native-distilled citronella oil and that distilled by English firms were due to adulteration or to the mode of distillation. Their work showed that the latter was the cause of these differences, and, in conclusion, they stated that the native-distilled commercial oils differ from those distilled by English firms in containing a highly optically active terpene, which raises the optical rotation, and a large percentage of sesquiterpene, which raises the specific gravity, the presence of which constituents reduces the odor value and impairs the solubility in alcohol; and that the products of the English firms possess much greater odor value than most native-distilled commercial oils.

## THE PHARMACEUTICAL VALUE OF SUMATRA BENZOIN.

By Thomas Dunlop.

The author examined a number of samples of commercial Sumatra benzoin and drew the following conclusions from his results: (1) Sumatra benzoin contained from 8 to 30 per cent. of barky and woody matter; (2) the price paid for the drug was no criterion of the quality; (3) if this variety were to be used pharmaceutically, it should be previously estimated, so that proper allowance could be made for impurities; (4) in the forthcoming British Pharmacopœia more accurate statements should be made regarding the actual "characters" and solubility of this drug.

## NOTE ON SOLUBLE COMPOUNDS OF ARSENIC.

By G. G. Henderson.

The writer prepared several compounds similar in type to tartar emetic, but containing arsenic instead of antimony. The sodium arsenio-tartrate was recommended as best adapted for medicinal purposes on account of its stability and ready solubility. It can be made by boiling 100 parts of arsenious acid with 190 parts of acid sodium tartrate.

## PHARMACEUTICAL ETHICS—A RETROSPECT.

By Leo Atkinson.

This paper embodied a consideration of the evils and annoyances which have hampered the advancement of pharmaceutical practice; but, in closing his remarks, the author took an optimistic view of the situation, and indicated measures whereby a healthier state of affairs might be hoped to be attained.

## NOTE ON SYRUPUS FERRI QUININÆ ET STRYCHNINÆ PHOSPHATIS (EASTON'S SYRUP).

By R. Brodie.

In this paper the writer proposed to modify the B.P.C. formula for this preparation by substituting hydrochloride of quinine for the phosphate at present

used. He did not consider the small amount of hydrochloric acid thus introduced as objectionable, and stated that most of the commercial syrups containing phosphates contain this acid in larger proportion.

## HYPOPHOSPHITES.

BY CHARLES T. TYRER.

The writer experimented with the tests of both the United States and British Pharmacopœias, and also with several unofficial methods. Those of the U.S.P. were found to be more definite and satisfactory than those of the B.P., particularly the qualitative tests. The permanganate method was not considered reliable, since hypophosphites invariably contained notable quantities of phosphate, phosphite, sulphite and hyposulphite, and these salts apparently answered the B.P. test, the cause being that they either directly or indirectly reduced the permanganate. Details of a volumetric method, which was said to be very accurate, for estimating hypophosphites by reduction of copper sulphate, were described by the author. The odor of $H_2S$, which is sometimes developed by hypophosphorous acid and syrup of the hypophosphites, was attributed to the use of charcoal as a filtering medium, the explanation being that hypophosphorous acid contains traces of sulphuric acid, which is decomposed by the charcoal forming $SO_2$, which is acted on by the hypophosphorous acid, forming $H_2S$.

## MEDICINAL PETROLEUM.

BY F. C. J. BIRD.

The fact that the medicinal petroleum oils, when emulsionized with a pure hypophosphite as one of the ingredients, developed a strong sulphuretted odor led the author to believe that they contained sulphur in some form, and in order to determine the extent of the impurity he examined a number of commercial samples, and summarized his conclusions as follows: White petroleum oil, having a specific gravity of about 0·855, could be obtained more free from taste and odor than lighter oils, but it was evident from the results that the bulk of the white oil found in commerce, much of which was sold as chemically pure, contained a greater or less proportion of sulphur compounds. White petroleum jelly was frequently a mixture of cerasine and white oil, and partook of the impurities of the latter. Very pale jellies, which were true non-crystalline petroleum residues, generally contained sulphur, probably due to an analogous process of bleaching. Yellow oils, although generally free from sulphur, were in many cases so tainted with a "paraffine" flavor as to be unfit for internal use. The yellow petroleum jellies, as far as sulphur was concerned, were the purest. Of the liquid petroleums, those from American oil were free from sulphur compounds, while those from Russian oils all contained these impurities. The presence of sulphur in the bleached products was thought to be due to the use of sulphuric acid.

## THE SALIENT FEATURES OF THE SCOTTISH FLORA.

BY G. C. DRUCE.

This was an extempore lecture, and the speaker stated that the British flora contained about 1,800 species, between sixty and seventy of which were confined to Scotland.

## NOTE ON THE STRENGTH OF COMMERCIAL SAMPLES OF ALKALOIDAL TINCTURES.

By Clarence A. Seyler.

Seven samples of the commercial tincture of nux vomica were examined, and in no case did the alkaloid found reach the theoretical amount, which is 0·229 part of alkaloids per 100 volumes, and in several the amount was considerably below this. Of eleven samples of tincture of opium, five gave about the theoretical percentage (0·75 per cent. part of morphine per 100), and three samples were considerably over the maximum strength possible with standardized opium. Tincture of belladonna was very variable, two samples containing only about one-half the proper amount of alkaloid. Three out of four samples of tincture of hyoscyamus were stronger than the standard suggested for this tincture. Tincture of aconite showed great variation. Samples of tincture (compound) of cinchona showed most variation, one sample which was over standard being nearly five times as strong as one having the lowest percentage of alkaloid.

## PHOSPHATES AND PLATINUM.

By W. G. Stratton.

In this note attention was called to the fact that when phosphates are heated in a platinum vessel in the presence of carbon, the platinum fuses.

## LIQUOR BISMUTHI ET AMMONII CITRATIS.

By W. G. Stratton.

The question with the author was whether a variation in the composition of the commercial solution was the cause of the varying results obtained when this preparation was dispensed with an alkaline bicarbonate.

An excess of ammonium citrate was found in five of eleven samples examined by the writer, and as this salt is known to prevent the precipitation of bismuth carbonate the examination furnished an affirmative answer to the question. Nitrates were found in some of the samples and one or two were markedly deficient in bismuth.

## DISINFECTANT SOAPS.

By S. Rideal.

The writer said it must not be forgotten that soaps themselves have some antiseptic power. An olein base was considered preferable to one containing palmitic or stearic acid, since the latter gives insoluble precipitates with hot water. Superfatted soaps were objectionable for disinfecting purposes, as fatty bodies impede the action of many of the germicides. A number of disinfectants were considered with reference to their usefulness or uselessness, as the case might be, when employed in soaps. Many of the so-called disinfectant soaps were found to have little or no value when subjected to bacteriological tests.

## OUR PRESENT KNOWLEDGE OF THE MYDRIATIC GROUP.

By Gordon Sharp.

This was a review of the various members of the mydriatic group of alkaloids, and in considering the supposed identity of several of these the author summarized his views by stating that (1) the names daturine and duboisine should be given up; (2) the relationship of atropine and hyoscyamine can hardly be

said to be clearly understood; (3) hyoscine is like atropine in its action; (4) scopolamine could hardly lay claim to being a new base.

The consideration of papers having been brought to a close, after occupying four sessions, the question of next year's meeting was brought up, and an invitation to hold the conference in Belfast in 1898 was accepted.

The following officers were elected for the ensuing year:

President, Charles Symes; Vice-Presidents, Walter Hills, J. Laidlaw Ewing, J. C. C. Payne, W. F. Wells; Treasurer, John Moss; Honorable General Secretaries, W. A. H. Naylor, F. Ransom; Honorable Local Secretary, R. W. McKnight; Assistant Secretary, J. C. Nightingale; other members of the Executive Committee, F. C. J. Bird, H. Collier, J. C. Umney, J. Anderson Russell, Edmund White, R. Wright; Auditor, D. W. Elliot; Editor of the "Year-Book," Louis Siebold.

## EIGHTH INTERNATIONAL PHARMACEUTICAL CONGRESS.

The following account of the meeting of the above-named Congress has been taken largely from the *Pharmaceutical Journal* of August 21, 1897:

The Eighth International Pharmaceutical Congress, organized by the Association Genéral Pharmaceutique de Belgique, was formally opened on Saturday, August 14th, in the Conference Hall of the University of Brussels, under conditions which promised great success, over 600 pharmacists from Belgium and other countries having registered themselves as members.

The chair was taken at the inaugural meeting by M. De Bruyn, the Minister of Agriculture and Hygiene, who was accompanied by several other Government officials and the members of the Organizing Committee. M. Ranwez, Professor at the University of Louvain, was elected President of the Congress, and M. Duyk, General Secretary. The delegates from the countries represented at the Congress were elected Vice-Presidents.

On Monday, August 16th, the first paper was presented by Professor Ranwez on "The Proportion of Active Principle in Drugs, etc." This was in answer to the query: "Is it not desirable in the present condition of scientific knowledge to insist on the presence of a normal proportion of active principle in a preparation?" and, after a general review of the subject by the author, he concluded by offering the following resolution: "That the competent authorities should require a uniform percentage of active or important principles in medicinal preparations." This resolution called forth considerable discussion, *pro* and *con;* but after the addition of the words "as far as possible," proposed by M. Petit, delegate from France, it was adopted by a large majority.

The next paper submitted was a "Report on New Medicaments," by F. E. Fayn, of Antwerp.

The author pointed out that the introduction of new chemical and animal products of late years has been attended with many inconveniences, and has placed the reputation of pharmaciens in a somewhat awkward position. Many of the products are monopolies, and are issued under names that give no clue to their chemical constitution. At the time they are introduced to the medical profession there is not sufficient information published concerning them to

enable the pharmacien to ascertain their strength or purity, whilst they actually vary both in strength and purity in commercial samples bearing the same label. He suggested, therefore, for the protection of the public, and for the safeguarding of the reputation of the prescriber and dispenser, that there should be special depots for new remedies established by pharmacists at certain centres; that the specially distinctive reactions of each new remedy should be published on the label as well as in the brochure relating to the remedy; that laboratories should be established by pharmaciens in certain centres for the analysis of new remedies; that a permanent committee for the study of new medicinal products should be established, the members of which should be selected by different Governments from the members of the academies of medicine or pharmacopœia committees; that there should be an official verification of serums and various glandular juices, etc.; that the nomenclature of new medicaments should be revised; that there should be an annual supplement to the Pharmacopœia published in every country. These suggestions were offered to the Congress for universal application, and in the discussion which followed, a resolution, "that trade-mark property should not be created in medicaments," was offered by M. Petit, and adopted by the Congress.

The discussion of Mr. Fayn's paper was resumed on Tuesday, and a resolution to the effect that the chief pharmaceutical associations in each country should be recommended to appoint authorized committees to carry out the work suggested by the author, was also adopted.

In Section I the consideration of the subject of specialties was again taken up. The first paper read was by Professor Remington, of Philadelphia, on "Pharmacopœial Revision; Its Influence on the Relations of Pharmacists and Physicians." The author especially advocated the endeavor to differentiate the practice of pharmacy and that of medicine as being the most effectual means of promoting the true interests of pharmacy and of those engaged in its practice. On the basis of progress made in that direction by securing the respect and co-operation of the best members of the medical profession, the practice of pharmacy would attain a position more compatible with the professional nature of the duties its followers have to perform, and they would be likely to find themselves acknowledged as welcome co-operators in the work of pharmacopœia revision.

Mr. Wren, Professor Tichborne and Dr. McWalter made some remarks, and Mr. Wootton posed as the advocate of secret remedies, supporting his argument by reference to the tradition that the only remedy from which the late Lord Beaconsfield could obtain relief was a secret preparation. On that ground he contended that the Congress would, in his opinion, be allowing zeal to outrun discretion if it gave its sanction to a recommendation that medical men should abstain from prescribing secret remedies, and when the purport of his remarks became known to the meeting by translation into the French language, considerable amusement was evinced.

In replying to the several speakers, Professor Remington said he would confine himself to the expression of his opinion that whatever might be Mr. Wootton's faith in the virtues of secret remedies, it was important for the interests of pharmacy throughout the world to place on record an enunciation of the principle that if any progress was to be made, it was above all indispensable to get away from secrecy in the preparation of medicines. To adduce the use of an

asthma cure by the distinguished statesman who had been mentioned, as a ground for the prescription of secret remedies by physicians, was, he thought, entirely illogical, for it might, with equal reason, be inferred that Lord Beaconsfield's death was due to his having taken the medicine referred to by Mr. Wootton.

The following resolutions were carried by acclamation :

(1) That efforts should be made to obtain larger representation of pharmacists in pharmacopœia revision, including professional teachers, as well as pharmacists in practice ; and (2) that local pharmaceutical associations should co-operate with medical societies with the object of suppressing quackery and the use of secret remedies.

The most interesting items in the later programmes included a comparison of pharmaceutical legislation in different countries, by M. Idiers ; the advantages and disadvantages of admitting women to practice pharmacy, by M. Georges Dethan ; several papers on a universal pharmacopœia ; and a consideration of the appointment of a board of reference, by M. Huart. Most important of all was the presentation of the following report :

REPORT OF THE CHICAGO COMMITTEE—PHARMACOPŒIA OF POTENT REMEDIES.

The committee reports that progress has been made, and it is now in correspondence with representatives of various nations relative to the appointment of members of the permanent commission in these countries. The illness of our distinguished *confrere*, Herr von Waldheim, of Vienna, has prevented the presentation of a full report at this time. The delays produced by the widely-separated locations of the correspondents in the various nations has added greatly to the difficulties, but the committee expects to complete the work as soon as possible. The resolutions adopted by the Seventh International Congress, under which the permanent committee derives its authority, are as follows :

"*Resolved*, That the Seventh International Congress appoint a committee of three, of which the President (Professor Remington) shall be chairman, the duty of which committee shall be to take the necessary steps for the appointment of an International Pharmacopœia Commission to compile, publish and distribute an international pharmacopœia of potent remedies. The International Pharmacopœial Commission shall consist of one member from each country represented at this Congress (Chicago), and from other countries as the committee of three may decide, the members of the Commission to be selected by the Pharmacopœia Committee of the various countries, or to be otherwise chosen if necessary. The committee of three shall be a permanent committee, and it shall be its duty to urge and expedite the work in every proper way, and in the event of the death or resignation of any member of this committee of three, the vacancy shall be filled by the other members.

"*Resolved*, That the Congress (Chicago) accepts with thanks the proffer, by the American Pharmaceutical Association, of the sum of $1,000 to help defray the expense of compiling, publishing and distributing an international pharmacopœia of potent remedies."

Respectfully submitted,

(Signed) JOSEPH P. REMINGTON, Philadelphia.
MICHAEL CARTEIGHE, London.
August 16, 1897. ANTON VON WALDHEIM, Vienna.

# AMERICAN PHARMACEUTICAL ASSOCIATION.

The forty-fifth annual meeting of the American Pharmaceutical Association convened at Lake Minnetonka, Minn., on Tuesday, August 24, 1897. A very cordial reception was tendered the visiting members of the Association *en route via* Chicago, by the Chicago Retail Druggists' Association and the Chicago Apothecaries' Society, at the Great Northern Hotel, Chicago, on Monday, August 23, 1897. Luncheon was served, and after it had been partaken of, a tally-ho ride to South Park, World's Fair site, and thence to the special train, which had been arranged for by the Chicago members, was extended. Hotel Lafayette was the headquarters of the Association at Lake Minnetonka. The council of the body met at 11 A.M., on Tuesday, August 24th. At 3.25 P.M., the same day, President Joseph E. Morrison called the first general session to order, and introduced Senator C. K. Davis, who welcomed the visitors to the hospitality of the good people of Minnesota and the "Twin Cities." Following him, Prof. F. J. Wulling bade the Association welcome on behalf of the Minnesota Pharmaceutical Association, which had just closed its meeting on the previous morning. The members were then extended a welcome to Minnetonka Beach, by its Mayor, Mr. J. C. Eliel. The Chair then asked Prof. Good to reply to the courtesies of the previous speakers, which he did in very expressive terms of appreciation. First Vice-President Geo. F. Payne was then called to the chair, while the President read his address, which was as follows:

*Ladies and Gentlemen:*

For the first time in our history we meet within the confines of what may be called the Northwestern States. After going all over this vast country and into Canada, we have come here to admire the natural wonders and beauties of this section, and to make more extended acquaintances among our brethren. When our Minnesota brothers, a year ago, came to our meeting and extended an invitation to us to convene "in the land of the Decotahs, where the Falls of Minnehaha flash and gleam among the oak trees, laugh and leap into the valley," it was gladly accepted, and we have since then been living in anticipation of seeing and hearing the water as it tumbles over the far-famed Falls of Minnehaha, and of gazing upon the beauties of Lake Minnetonka, a gem set by the hands of the Almighty in the midst of this fair land; nor have we been disappointed; although we had been prepared for beautiful sights, the realization exceeded the anticipation, and one glance from the shores of this lake has repaid us for the toil of our journey.

However, we do not come here to indulge in poetic flights of fancy, but to discuss the hard matter-of-fact interests of to-day, an undertaking devoid of any tendency towards poetic license. Unfortunately, we pharmacists have not much time to cultivate the muses, as our attention is too closely concentred on the grosser things of material earth, so we will dismount from our Pegasus and stand on solid ground.

Your President was asked by the State Department to name delegates to represent the United States at the Brussels International Pharmaceutical Congress, and in accordance therewith I named Prof. J. P. Remington and Mr. Louis Dohme as such, and Mr. Alfred Myers, of New Orleans, and Dr. F. B. Power, now of London, England, as alternates.

The reports of the various committees will show that the work of the Association has been carried on with the same enthusiasm and generally successful results as heretofore.

I desire, however, to draw attention to the very effective work done by the Committee on National Legislation, especially as regards tax-free alcohol, which requires eternal vigilance on the part of the committee to guard against attacks from unexpected quarters, as evidenced by the proposal made in the Senate to tax wood alcohol, which, if successful, would have had serious results. Happily, the secretary of the committee, Mr. A. E. Ebert, is one of those who is always on guard and never sleeps at his post, so that as soon as the proposition was made, Mr. Ebert immediately telegraphed to over eighty of the Senators, protesting in the name of this Association against any such taxation; and we think we are justified in claiming that Mr. Ebert's prompt and energetic action was the main cause of the rejection of Senator Lindsay's motion.

The first question which I desire to take up is that of membership. For several years past our numbers have fluctuated between 1,500 and 2,000. The last report of the Membership Committee showed that we had 1,800 enrolled in this Association. At the same time, the Secretary of the Section on Legislation and Education, in his report, stated that there were 51,000 druggists in the United States and 2,000 in Canada, making a total of 53,oco from which we can draw for our members. The discrepancy thus revealed between our membership and the total number of pharmacists is indeed very striking; and, even admitting that 53,000 represents good, bad and indifferent, and perhaps many who would or should not be deemed desirable to be had as members, there still remains a great field for earnest work in the direction of recruiting our ranks. Five thousand is a moderate estimate to make of what our numbers should be before we can become, as has been suggested, a delegate organization, such as the American Medical Association, or before we can hope to wield the influence to which our organization is entitled by reason of the high objects which it has in view.

The securing of new members is a matter which has heretofore been left solely and entirely in the hands of the committee charged with this work. That committee has been unremitting in its efforts, and I know that the chairman and members of the Auxiliary Committee have rendered yeoman service. While, however, expressing my appreciation of the valuable work done by these gentlemen, I will avail myself of the opportunity offered to state that on the part of the members at large, more could and should be done towards increasing our membership. Every member of the Association should constitute himself an auxiliary member of the Auxiliary Committee, and should take advantage of every occasion which presents itself for setting forth the benefits to be derived from this Association, or enlisting the sympathy and active interest of fellow-pharmacists in this Association.

It has been brought to my notice that many valuable papers are presented at the annual meetings of the State associations by members of this body, and that these papers would be presented at our meetings if the State associations were not in existence. Among these papers are to be found many worthy of a wide circulation, and of being preserved in more permanent form than that offered by the usual volume of State association proceedings. I would, therefore, suggest that an arrangement be entered into with the State associations by which we would be permitted to publish these papers in our Proceedings, subject to the approval of our Committee on Publication. We would thus secure what is best and most worthy of preservation among these papers, and also make our Annual Proceedings a more complete record of pharmacal progress in this country.

The Treasurer's report will contain a statement of the number of members who have been delinquent in the payment of their fees, and who will be dropped from the rolls. The number of delinquents has been increasing of late years, and it is not difficult to assign the principal reason for this state of affairs. It is due simply to the changed and changing conditions of pharmacy. The pharmacist, origiually a manufacturer, and a combination of chemist, botanist and merchant, has allowed the last-mentioned component to greatly overshadow the others, and has become almost entirely a dealer in patent medicines, toilet articles, soda water and drugs. The laboratory is not to be found in connection with modern pharmacy. Everything that should be made is bought from the wholesaler or manufacturer. Pharmacy as a profession is apparently a thing of the past, and is now but a trade or mercantile pursuit. But I believe that we are now going through one of the transition stages in the process of evolution which governs all things, and that we will find our present troubles to have been a fire of purification in preparation for a new era, in which pharmacy will be differentiated into a profession and a trade. We see evidence of this in the pharmacal journals and the colleges. We find the former devoting a large amount of their space to the matter of advertising and other strictly commercial topics, showing that the mercantile feature is rapidly developing. On the other hand, we find that the colleges are increasing the number and length of their courses. Subjects which some years ago were thought unnecessary or useless are now included in their curricula, and pharmacy by them is regarded as a profession alone.

Can the average individual put into practice his college instruction in chemistry, pharmacy, pharmacognosy, microscopy, etc., and at the same time look sharply after the buying and selling of the thousand and one items which go to make up the stock of the modern pharmacy? Impossible. And a change must come and we must prepare for it. If we desire to follow pharmacy as a trade, we must adopt the methods of other trades. We must buy in the cheapest market, sell as cheaply as our neighbors, use printer's ink on every possible occasion and in every possible way, and, in a word, spare no effort to increase our trade.

But then we must be prepared to stand the fierce fire of commercial competition, and cannot claim, because we are druggists, any more protection than that given other merchants.

As it is now, we have gone outside of our own territory and invaded that of every other trade, and added their goods to our stock under the name of "side lines."

Remedies innumerable have been proposed for the present depressed condition of pharmacy. You cannot control commerce; trade will seek its own channels in spite of laws or obstacles; and, as far as I can see, there is only one way out, that is to return to pharmacy proper; devote more attention to the laboratory, cultivate more cordial feelings with the medical profession and strive for higher ideals. The higher the standard we set up, and the closer we approach to it, the greater will be the esteem in which we will be held by the public.

One of the first requisites for the elevation of the profession is more stringent pharmacy laws, and more especially as regards examinations. In this connection I would say that the Section on Legislation and Education will present for our consideration a model pharmacy law.

Now I wish to draw attention to what I consider a fault in all American pharmacal legislation. As far as education is concerned, they all begin at the wrong end. By this I mean that no supervision is exercised over students or apprentices in drug stores. It is the almost universal custom to take any boy applying for a position without any examination as to his mental equipment and general fitness for the profession; and if he does his work reasonably well, he is promoted from errand boy to clerk, and then to dispenser, and after three or four years' service he commences to prepare for his examination, in which, by means of quiz compends and other cramming devices, he succeeds. Of course there are exceptions; but I believe that the number of college graduates is out of proportion to the number of young men employed in drug stores. If pharmacy is to become a profession, we must commence with the beginners. We must have a class of men who have acquired a sound foundation upon which to erect the composite structure which we call the science of pharmacy. If the law recognized a class of apprentices and compelled all desiring to study pharmacy to pass an examination in such subjects as arithmetic, history, geography, elementary algebra, and one modern language besides English, either German or French, before a board named by the Board of Pharmacy, and consisting of two or more well known high-school teachers, a superior class of young men would be attracted to the study of pharmacy proper, who would almost invariably become college graduates, and would aim at becoming proficient pharmacists rather than merely passing the board examination. This requirement would also lessen the number of clerks and pharmacists and decrease competition, which is one of the greatest evils of the present system.

The delegation to the American Medical Association will bring before you for consideration a most important question, viz.: Will Spiritus Frumenti and Spiritus Vini Gallici be retained in the next revision of the Pharmacopœia? There is no necessity for my dilating on the evils of the liquor traffic, and the incalculable amount of injury it has done to American pharmacy. The pharmacists of the United States are at present in a peculiar position; for just as long as liquors are sold in pharmacies, even if only on prescriptions, will we be in the eyes of the Government on the same footing as saloon-keepers. It is time that this condition of things be terminated by the complete abolition of every form of dealing in fermented or spirituous liquors. A great advance in that direction will have been taken when it will be decided to delete all such preparations from the Pharmacopœia. For my part, I believe that the sale of liquors by pharmacists is unnecessary, and is simply a result of a bad habit into which we have allowed the public to fall. In the Province of Quebec, pharmacists do not deal in liquors. The physician, when desirous of prescribing stimulants, invariably sends his patient to the grocer; and in all my experience of twenty years as a retail pharmacist, I do not believe I have had to sell a quart of liquor, except during the time I was employed in this country. I am not a temperance crank, but I believe that the sale of liquor is degrading to the profession of pharmacy, and is an unmitigated evil. The only excuse which I have heard advanced for the retention of this class of preparations in the Pharmacopœia is that we have a standard by which to test our goods. Now, let us examine the reliability of this standard Under "Spiritus Frumenti," we find the Pharmacopœia says: "Its specific gravity should not be more than 0·930 nor less than 0·917, corresponding approximately to an alcoholic strength of 45 to 50 per cent. by weight, or 50 to 58 per cent. by volume"—a rather wide margin. And is the test for impurities any more reliable? Under "Spiritus Vini Gallici," we find that "Its specific gravity should not be more than 0·941 nor less than 0·935, corresponding, approximately, to an alcoholic strength of 39 to 47 per cent. by weight, or 46 to 55 per cent. by volume." The tests for fusel oil, etc., are not more definite than under "Spiritus Frumenti." An examination of the tests for wines will show that they are not more definite. Admitting that the tests are suffi-

ciently exact, I would like to ask, how many pharmacists test their liquor purchases to see if they answer the requirements of the Pharmacopœia? Furthermore, of what benefit is the standard to us, when the price we have to pay for it is the levelling of the profession of pharmacy, in the eyes of the Government and of the public, to that of the saloon-keeper? The price is too great to compensate for any imaginary or even possible or probable advantage.

I have only touched upon one phase of the question. The therapeutical aspect is one outside of our province.

Another important question which we should take up is that of patented medicinal compounds. During the past ten or twelve years a number of organic compounds, principally of German origin, have been patented and introduced into this country. One peculiarity of these goods is the very high price charged here in comparison with that ruling elsewhere. I give a comparative statement of prices which obtain in the United States and Canada:

| | U. S. A. | Canada. |
|---|---|---|
| Phenacetine | $1.00 | $0.35 |
| Sulphonal | 1.35 | .30 |
| Trional | 1.50 | 1.00 |
| Chloralamid | .90 | .35 |
| Antipyrine | 1.40 | 1.10 |

Now, why should the people of the United States be compelled to pay such exorbitant rates as are shown here? It is simply due to the patent laws of this country, which allow a patentee to cover everything within his reach. Patent laws are avowedly designed for the encouragement of inventive genius, by guaranteeing to an inventor an adequate return for the trouble and study required for the invention of new appliances, new methods, etc., and it is as much to the United States patent laws as to any other cause that this country owes its proud pre-eminence in the manufacturing world.

In the matter now under consideration, I venture to say that such a contingency was never foreseen by the framers of the law. Nor do I think it was ever intended that the law should have any such results as have come from its application to the invention or discovery of new remedial agents. One of the objects of the law was the encouragement of inventive genius. Has it operated in this case? No. For not a single new synthetic compound has been discovered and brought to completion in this country since the flood of synthetics first began to pour into the United States. The only result has been the enriching of the few at the cost of the whole country, and, as a matter of fact, the American people have been paying foreigners millions annually for taking advantage of the privileges granted by the United States patent laws.

Looked at in any light, except in that of the German patentee and his American representative, this position of affairs is intolerable; and it is for us to draw the attention of the legislators of this country to the gross iniquity perpetrated upon the sick. Germany is the home of these preparations, but an examination of the German patent laws shows that such preparations as those we speak of cannot be patented. The patent law of April 7, 1891, says:

"Discoveries of food-stuff or medicinal preparations, or bodies which may be prepared by a chemical method, cannot be patented, but that the method of preparation of these objects may be."

Now, if German manufacturers cannot patent their products in their own country, why should they be allowed to do so in this?

Turning to France, we find the law of July 5, 1844, which is still in force, says:

"May not be patented: first, pharmaceutical compounds or remedies of every sort, these articles remaining subject to the special laws and regulations on this subject, and particularly to the law of August 18, 1810, relative to secret remedies."

Again we find in a recent report of the commission appointed by the French Minister of Public Instruction, to prepare a new Pharmacy Act, that they propose the following clause to be added to Article 9, which sets out that none but pharmacists shall sell remedies, either compound or simple, used in human or veterinary medicines.

"These remedies and their method of preparation cannot be made the subjects of a patent. Their scientific or commercial names fall into the public domain, and cannot become private property, nor constitute in themselves a trade-mark. Secret remedies remain prohibited."

These quotations require no comment.

If the patentees of these remedies were satisfied with a reasonable profit, we might not complain. It may be claimed that the great expense of advertising and introducing these preparations necessitates high prices; but does it cost more to advertise these goods in this country than it does in Germany or England or Canada, where the prices are so much lower?

And is it not a fact that most of the advertising is free? Do we not see, month after month, communications in the medical press on the action of the new synthetics in certain affections? This is the most effective kind of advertising, and it is impossible to imagine that the journals in which these articles appear would receive pay for their publication. There is no reason for the high prices charged for these goods, but the knowledge of the patentees that with the process and product patented and the name copyrighted, they have an absolute monopoly, and can charge just what they please. What we want is that the patent laws be changed on the lines of German laws, which, while safely guarding the public from extortion, give ample protection to the patentee. We should demand that products used in medicine should not be patented, and that the names by which they are known in commerce should not be copyrighted.

On this subject a resolution was presented and adopted at the last convention, but it did not go far enough. I would therefore suggest that although this work would be within the province of the Committee on National Legislation, a special committee, composed of one member from each State and Territory and all members residing in the District of Columbia, be appointed to undertake and carry on an agitation for the amendment of the United States patent laws on the lines already indicated.

I would also suggest that our delegation to the American Medical Association be instructed to bring this matter before the next convention and secure the endorsation of that body; that we also secure the co-operation of all the State associations through their delegates present at this convention, and, in fact, employ every legitimate means to accomplish our object.

The address was received and referred to a committee composed of Messrs. Ebert, Thompson and Whelpley, appointed by Vice-President Payne.

President Morrison then resumed the chair, and Secretary Caspari called for the reports of the various standing and special committees. These were ready.

The selection of the Nominating Committee to elect the officers for the ensuing year was the next business in order, and a recess of five minutes was granted by the President in order to afford the members from the various States, Territories and Provinces an opportunity to choose their representatives. At the end of this time the meeting was again called to order. Secretary Caspari then called the roll for the names of the nominators. Responses were had from Arkansas, Colorado, District of Columbia, Georgia, Illinois, Indiana, Indian Territory, Iowa, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Maine, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Dakota, Texas, Virginia and Provinces of Manitoba and Quebec. In addition to those representing these sections, the President appointed at large Messrs. Ebert, Tilden, Good, Frost and Main as members of the Nominating Committee. The committee decided to meet immediately after the adjournment of the session. Secretary Kennedy then read the minutes of the meeting of the Council. These comprised the various motions which had been made in the body, and statements of such measures as had been adopted during the past year, as well as certain proposed changes in by-laws. The minutes also dealt with a proposition to reinstate Mr. Frederick Stearns to membership in the Association, from which he had been previously expelled. The correspondence connected with this matter follows here in full:

CHICAGO, August 20, 1897.

MR. A. E. EBERT, City.

*Dear Mr. Ebert:*—I have the pleasure to send you a letter received from Mr. Stearns in reply to one from myself to him, in relation to the proposition made by several of his old friends, to bring about a reinstatement of Mr. Stearns as a member of the American Pharmaceutical Association. You will observe he takes a very manly position, and one that can hardly fail to create a kind feeling toward him in those who do not know him, and a feeling of respect and confidence by the old friends who know him well. The many years which have passed since

the event of his severance from the American Pharmaceutical Association have no doubt caused most members to forget the cause of it, and there is little reason for reviving the history of it now; to me it is sufficient that a former member and a gentleman has seen the error of his hasty decision, and is willing to stand upon his more recent record for vindication of his character and motives.

As I cannot be present at the meeting of the American Pharmaceutical Association, I would be glad if you will present the matter to the council for their approval, and trust that our action may be viewed favorably and receive endorsement, to the end that a worthy man may be relieved from the odium which attaches to dismissal from membership, when he confesses and repents of his hasty action of long ago.

Sincerely yours, E. H. SARGENT.

Mr. Stearns' reply was as follows:

DETROIT, MICH., August 13, 1897.

MR. E. H. SARGENT, Chicago, Ill.

*Dear Sir:*—Your kind letter of August 7th, in which you ask my feelings and sentiments regarding the action of the American Pharmaceutical Association in depriving me of membership, as a penalty for the violation of its code of ethics, nearly thirty years ago, and your expression of desire—having been its presiding officer at that time—to take some action now, with a view to my reinstatement to fellowship if possible, comes to me as a pleasant and grateful surprise.

The error for which I have borne the penalty for so many years would never have been committed in the light of maturer experience and reflection, and I have accepted the verdict of my peers, realizing that it was just, though, perhaps, unduly severe.

I have suffered banishment from fellowship with friends and members of the Association for nearly thirty years, depriving myself of their friendship and esteem, because I did not take time to consider the far-reaching effects of not bowing to the will of the Association at the time.

This I now sincerely regret; therefore, while I have never asked to be reinstated, and would not urge it now, yet I would gladly receive such treatment from the Association as would show that my business career since that time justifies it in taking the action you are to propose. Sincerely yours, FREDERICK STEARNS.

The minutes were approved as read.

Secretary Kennedy then read the names of eighty-one applicants for membership, and they were invited to become members. After this, President Morrison appointed a Committee on Time and Place of Next Meeting, consisting of Messrs. Sheppard, Dohme, Kuhn, Miller and Jacobs. This committee met in the council chamber, after the adjournment of the Nominating Committee, and the invitations which had been received from Richmond, Omaha, Baltimore and Texas to hold the meeting of 1898 in these respective places, were referred to it.

Secretary Caspari also read a communication from the Minnesota Pharmaceutical Association, which embodied a resolution against the present copyright laws, and also a proposition that a bill be drafted to revise these laws, as they apply to certain well-known chemicals. This communication was received and referred to the Committee on National Legislation. This was followed by a communication from the Proprietors' Section of the National Wholesale Druggists' Association, which was referred to the Commercial Section. A communication from the chairman of the delegates to the American Medical Association was referred to Council.

Two communications from the national delegates to the Brussels meeting of the International Pharmaceutical Congress were then read. A letter signed by a dozen or more military pharmacists was next read. It expressed appreciation of the work that has been done by the Association toward improving the status of the apothecaries in the Government service.

After this, Professor Whelpley offered a motion resolving that the members of the Association be requested to use the metric system of weights and measures in all the business of the Association, and in papers, reports, circulars and communications presented to the Association.

After some discussion this was adopted. The session then adjourned until the following morning. In the evening a reception and promenade concert, followed by informal dancing, was tendered the visitors by the members of the Minnesota Pharmaceutical Association. The events of the evening were much enjoyed by all.

### SECOND GENERAL SESSION.

The second general session convened at 10.27 A.M., Wednesday, August 25th, with President Morrison in the chair. Secretary Caspari read the minutes of the first general session. These were adopted as read.

The minutes of Council were then read by Secretary of Council Kennedy, who spoke of the acknowledgment by Mr. Stearns of his error, and stated that as the Council saw no obstacle in the way, he was reinstated to membership. Twenty-two new applicants for membership were reported. The minutes also stated that Professor Oldberg had reported that the Proceedings of the Seventh International Pharmaceutical Congress, held in Chicago in 1893, were ready, and that the price had been fixed at 50 cents per volume. The minutes were approved.

Secretary Payne, of the Nominating Committee, reported the following ticket as the choice of the committee for the officers of the Association for the ensuing year:

President, H. M. Whitney, Lawrence, Mass.; First Vice-President, Geo. C. Bartells, Camp Point, Ill.; Second Vice-President, W. S. Thompson, Washington, D. C.; Third Vice-President, J. A. Miller, Harrisburg, Pa.; Treasurer, S. A. D. Sheppard, Boston, Mass.; General Secretary, Chas. Caspari, Jr., Baltimore, Md.; Reporter on Progress of Pharmacy, C. Lewis Diehl, Louisville, Ky.; Members of Council for three years, W. A. Frost, C. A. Mayo and Geo. F. Payne.

The report was received, and the Secretary was asked to cast an affirmative ballot for the nominee for the presidency. This was followed by similar ballots for the remaining nominees.

Secretary Caspari then announced that he had received the credentials of delegates from a number of State and local associations, colleges of pharmacy, alumni associations and other bodies. On motion, these were received by the Association.

Chairman Dohme, of the Finance Committee, reported fair prospects for the betterment of the Association's finances.

Secretary Kennedy, of the Committee on Membership, presented his twenty-third annual report. Of the 114 persons proposed for membership at the Montreal meeting last year, 91, or about 80 per cent., had completed their membership, and have their names on the roll as active members. The percentage of those who were proposed and invited to become members, and who finally completed their membership, was much larger this year than last, and was a little above the average of former years. The new members represented nearly all sections of our country. They are credited to twenty-eight States, the Dis-

trict of Columbia, Canada, East Africa, and Paris, France. Every State and Territory is now represented by membership in the Association. Mr. Kennedy also said: "The Treasurer, Mr. S. A. D. Sheppard, reports that on July 1, 1897, 241 delinquents of three or more years, were liable to be dropped from the roll. This is a very large number, being an increase of thirty-two over the number reported last year, when the secretary of membership made a statement that the number reported on then was the largest since he has filled the office." He also called the attention of the meeting to the excellent work which has been performed by W. H. Huntington, apothecary of the United States Navy, at Newport, Rhode Island, and a member of the Association, who had secured the consent and annual fee in advance, and had endorsed forty-one of the apothecaries of the army, navy and marine hospital service of the United States. The following tabulated statement of membership was then read:

| | |
|---|---|
| Active or contributing members in good standing at last report | 1,448 |
| Members elected since last report | 91 |
| Total | 1,539 |
| **LOSS IN MEMBERSHIP (ACTIVE).** | |
| By resignation | 35 |
| By transfer to life membership | 13 |
| By death | 30 |
| Dropped from roll for various causes | 67 |
| Total loss | 145 |
| Number on the roll at this report | 1,394 |
| **LIFE MEMBERSHIP.** | |
| Number on the roll at last report | 95 |
| Number added since last report | 13 |
| Total | 108 |
| **LOSS IN LIFE MEMBERSHIP.** | |
| By death | 6 |
| Number on the roll at this report | 102 |
| **HONORARY MEMBERSHIP.** | |
| Number on the roll at last report | 15 |
| Loss by death | 2 |
| Number on the roll at this report | 13 |
| **TOTAL MEMBERSHIP.** | |
| Active or contributing members | 1,394 |
| Life members | 102 |
| Honorary members | 13 |
| Total | 1,509 |

The Secretary also reported that the mortuary record, which numbered twenty-nine deaths, was the largest that he had yet been called upon to report.

Appended to his report was a memorial sketch of each of the deceased members. The report was referred to the Committee on Publication. Secretary Whelpley, of the Auxiliary Committee on Membership, made a motion to extend the thanks of the Association to the Presidents of the State Associations and to Mr. Huntington for their interest in the effort to increase the membership. Prof. C. Lewis Diehl read the introduction to his Report on the Progress of Pharmacy. The report was received and referred to the Committee on Publication. The report of the Committee on Revision of the United States Pharmacopœia was called for and read by title, but was referred to the Scientific Section for reading in full and discussion. Treasurer Sheppard then read his report, and stated that the cash balance in the treasury this year was nearly double what it was last year. He suggested, in view of the depressed condition of business, that the resignations of the delinquent members be received instead of dropping them for non-payment of dues. The Auditing Committee found the report to be correct, and it was received, and a vote of thanks was tendered the Treasurer by the Association.

The General Secretary then read his report, which dealt with the financial accounts in his hands, and the publication of the National Formulary. He reported a handsome balance on hand from the sale of the National Formulary. It was ordered that the report take the usual course. The Committee on Publication reported on last year's volume of Proceedings, and also on the stock of the Proceedings on hand. The report was received.

Mr. Ebert moved that the General Secretary be authorized to bring to the annual meetings a number of unbound copies of the Constitution and By-Laws, and of lists of officers, members, places of meeting, etc., for the use of members in attendance. Secretary Caspari then read the report of the Committee on General Prizes for papers presented at the meeting in Montreal. The first prize was awarded to J. W. T. Knox and A B. Prescott, for their paper on "The Caffeine Compound in Kola;" the second to S. P. Sadtler, for his contribution entitled "Some Results Obtained in the Destructive Distillation of Linseed Oil, with Remarks on its Bearing on Engler's Theory of the Origin of Petroleum;" and the third to W. O. Richtmann and Edward Kremers, for their article on "The Menthol Group." The report was adopted.

The Committee on Ebert Prize awarded it to Messrs. Knox and Prescott, for the paper previously referred to. The Committee on President's address recommended that the papers contributed to the meetings of the State Associations be secured for the use of the Reporter on the Progress of Pharmacy for abstracting or printing in full, as he may see fit. They also approved of the educational measures proposed by President Morrison, and coincided with him on the subject of dropping liquors from the Pharmacopœia. Considerable discussion was elicited by this last proposition, and was participated in by Messrs. Whitney, Mayo, Sheppard, Ebert, Eliel, Torbett and Alpers. The report of the Committee was finally accepted, with the exception of the proposition to eliminate liquors from the Pharmacopœia.

The twenty-two new applicants for membership were then invited to complete their membership, which they did by signing the Constitution and paying the annual fee.

The Committee on Time and Place of Next Meeting submitted three reports in favor of Baltimore, Omaha and Richmond, respectively. The majority

report proposed that the next meeting take place in Baltimore, on the first Monday in September, 1898.

The reports were received, and after some discussion a ballot was taken. Of the ninety-one votes cast, thirty-four were for Omaha, forty-nine for Baltimore and eight for Richmond. A unanimous vote was then cast for Baltimore. The time of meeting could not be agreed upon, so the matter was referred to the last general session. The meeting then adjourned until 3.45 P.M., when it was again called to order, prior to the convening of the Commercial Section. The special session then adjourned and Chairman Hopp called the Commercial Section to order. In the absence of Secretary D'Avignon, Mr. Patton was elected Secretary *pro tem.* D. R. Noyes delivered an address of welcome to the Section. Mr. Dewoody then took the chair, while Mr. Hopp delivered his address. He advocated the revision of the United States copyright laws, and suggested that the co-operation of State Associations, and of the American Medical Association be obtained. He advised standardization of drugs, and the adjustment of the minimum and maximum limits of the standard. He re-suggested 50 per cent. tinctures and recommended that such preparations be advertised to the physicians as a means of combating the large manufacturers. He asked for some form of rebate plan free from the evils of previous plans for protecting the retailer in prices. He favored the interchange of certificates of registration by boards of pharmacy. The address was referred to a committee appointed by Mr. Dewoody, and consisting of Messrs. Stewart, Ebert and Good. There were no reports of committees to be heard from, nor were there any papers read.

Chairman Hopp read a communication from the Proprietors' Section of the National Wholesale Druggists' Association, which suggested that a committee on fraternal relations be appointed to confer and co-operate with similar committees from State Associations to prevent substitution. The communication was received and its import discussed. Mr. Ebert mentioned a plan whereby the proprietors of patent medicines could secure to the retailer the full retail price, if they so chose. The plan mentioned was the establishment of distributing depots, which should have complete supervision of all the stock handled in a community, both by jobbers and retailers. Under such arrangements the price-cutters would soon be identified, and could be denied such stock as they cut price on. But Mr. Ebert declared the proprietors did not want the retailer to ask the full retail price, and both he and Mr. Whitney cited instances where the proprietors had come to them and quoted such prices and terms as would induce many to meet the cut rates. Much argument was expended on the matter of this communication from the proprietors, by Messrs. Werner, Main, Whitney, Hammel, Bobbett, Sheppard, Simmons, Hassebrock, Dohme, Ryan, Holzhauer and Thompson. The consensus of opinion was that the experience with the proprietors in the past did not warrant the appointment of a committee, as suggested by them, that the retailer is able to take care of himself, and that the time had come when he should await the action of the proprietors to protect him, and not ask their interest in his behalf. It was also shown that the products of the various State manufacturing pharmaceutical associations, like those of Illinois, Minnesota and Wisconsin, were in a large measure replacing many of the proprietary products, and it was believed on account of this that the proprietors would be glad in the near

future to adopt some means of protecting the retailer in obtaining the full retail price set by the proprietors on their products. The Secretary was finally instructed to acknowledge the receipt of the communication, and to state that the Association did not see fit to appoint the committee suggested. The Committee on Chairman's Address approved the measures proposed therein. The report was received and the recommendations adopted. The following officers were nominated and elected for the ensuing year:

Chairman, Joseph Jacobs, Atlanta, Ga.; Secretary, J. Hal. Bobbett, Raleigh, N. C.; Associate Members, N. A. Kuhn, E. C. Bent and H. F. Hassebrock.

When he came to be installed, Mr. Jacobs was loath to accept the chairmanship, and told the Association he thought they were doing just the opposite of what they had been proposing to do but a few minutes before; that he was an arch-cutter, and was proud of the fact, and that the Association had better reconsider his election. Still, he said, if it was the intention of the Association to kill the Section, they had taken the necessary means.

Messrs. Mayo, Ebert and Stewart replied to Mr. Jacobs, and assured him that the Association had elected him in a full consciousness of his beliefs and methods; they acknowledged that the Section had not done in the past what it was intended to do, and stated that was the reason for trying a chairman who held opposite views.

Mr. Jacobs accepted after much hesitancy, and promised to do the best he could in his peculiar position.

A vote of thanks was given the retiring officers, and the Section adjourned, subject to call of the Chair.

In the evening, President Cyrus Northrup, of the University of Minnesota, delivered an address on Education. On Thursday, August 26th, the Ladies' Auxiliary conducted a trolley tour of Minneapolis and St. Paul, for the visiting ladies and their escorts. The party left Hotel Lafayette at 8 A.M. Lakes Harriet and Minnetonka were included in the itinerary, lunch was served on the beautiful grounds of the State University, and in the afternoon Como and other points of interest within the borders of the saintly city were viewed.

On account of this excursion, when Chairman Alpers called the first session of the Scientific Section to order, at 9.40 A.M., only a dozen members of the Association were in attendance. Mr. Geo. B. Kaufmann was elected Secretary *pro tem.* On account of the small attendance, the reading of the Chairman's address was postponed until the evening session. The report of the Committee on Indicators was then presented. It was as follows:

*Mr. Chairman and Members of the Association:*—The third report of the Committee consists principally of some results obtained by certain of the workers who were dissatisfied with some of their data in last year's report. Prof. J. U. Lloyd and the Chairman, after comparing their results reported at the Montreal meeting, decided to repeat the work for coca leaf and its fluid extract. This it was concluded should be done on about the same date and in the same manner. The Chairman prepared the material and forwarded it with instructions.

FLUID EXTRACT OF COCA LEAF.

For assaying this preparation the directions of the committee, as reported in the Proceedings for 1896, were adhered to, employing, however, enough of the fluid extract to make six or seven determinations from the same extraction, so that there would be no source of error here.

Titrations were executed only with chlorophyll-free (nearly) alkaloids, using the most satisfactory indicators, viz.: Brazil wood, cochineal and hæmatoxylon.

The results reported by Lloyd and Kebler last year, on fluid extract of coca, were as follows:

| | Lloyd. | | Kebler. | |
|---|---|---|---|---|
| | Gravimetric. | Volumetric. | Gravimetric. | Volumetric. |
| Brazil wood | 0·48 | 0·34 | 0·53 | 0·35 |
| Cochineal | 0·57 | 0·29 | 0·55 | 0·40 |
| Hæmatoxylon | 0·53 | 0·27 | 0·54 | 0·38 |
| Lacmoid | 0·60 | 0·35 | 0·50 | 0·38 |

While all of their other results agreed quite closely, this position was considered unsatisfactory.

On assaying the second fluid extract, November 7th, the results were as follows:

| | Lloyd. Using Alcohol. | | Lloyd. Excluding Alcohol. | | Kebler. Using Alcohol. | | | |
|---|---|---|---|---|---|---|---|---|
| | Gravimetric. | Volumetric. | Gravimetric. | Volumetric. | Gravimetric. | | Volumetric. | |
| Brazil wood | 0·406 | 0·328 | 0 36 | 0·323 | 0·369 | 0·416 | 0·277 | 0·289 |
| Cochineal | 0·37 | 0·290* | 0·412 | 0·298* | 0·416 | 0·416 | 0·277 | 0·286 |
| Hæmatoxylon | 0·406 | 0·315 | 0·376 | 0·321 | 0·384 | 0·370 | 0·290 | 0·293 |
| Average | 0·394 | 0·311 | 0·383 | 0·314 | 0·389 | 0·401 | 0·315 | 0 289 |

The average of Lloyd's gravimetric results is 0·388; of Kebler's gravimetric, 0·395; difference, 0·007 per cent. The difference of the volumetric results is 0·011 per cent.

### ASSAY OF POWDERED COCA LEAF.

Since the mode of procedure is contained in the report of the workers, the directions will not be repeated here. Prof. Lloyd reported his work as follows: 50 grammes of the powdered coca, not previously dried to constant weight, were put into a one-half gallon bottle and covered with 500 grammes of chloroform ether (1 to 3) mixture; after five minutes' rotating, 50 c.c. of 10 per cent. ammonia were added, and the bottle shaken for two hours, almost continuously, occasionally cooling the bottle in cold water. Then 50 grammes more of 10 per cent. ammonia were added, well shaken, and finally, seven times 50 grammes of the ethereal fluid drawn off. Six of them were assayed, with results as follows: (Probably it was case F, where some difficulty was experienced in pouring off 50 grammes.)

| | | Gravimetric. | Volumetric. |
|---|---|---|---|
| Hæmatoxylon | A, | 1·102 per cent. | 1·000 per cent. |
| " 3 drops | B, | 0·994 " " | 0·957 " " |
| Cochineal | C, | 1·038 " " | 0·950 " " |
| " 3 drops | D, | 1·096 " " | a–0·927 " "<br>b–0·982 " " |
| Brazil wood, 50 drops | E, | 1·002 " " | 0·952 " " |
| " " 10 " | F, | 0·944 " " | 0·897 " " |
| Average | | 1·029 per cent. | 0·952 per cent. |

In case D, it was attempted to see what effect the exclusion of alcohol would have on the results. The visible effect is that it is difficult to dissolve the alkaloid completely from the resinous material. After volumetric results were found too low (see *a*), the same determination was continued by adding an equal bulk of alcohol, which caused an increase in the results (see *b*).

In these experiments the titrations were carried out in the same beaker in which the gravimetric results were obtained. The varnish-like residues were dissolved in 5 c.c. of alcohol, 2 c.c. of N/10 sulphuric acid and 10 c.c. of water were added, then the indicator, and the excess of acid titrated back with N/100 potassium hydroxide. In each case 1 c.c. of N/10 was added again and the excess titrated back with centinormal potassium hydroxide.

Hæmatoxylon and cochineal gave sharp changes of tint; also brazil wood, but the latter indicator requires a trained eye to see the change plainly. However, the solution may have deteriorated.

Mr. Kebler proceeded exactly as did Professor Lloyd, except that the shaking was intermittent instead of almost continuous, shaking about every fifteen minutes during two hours. His results were as follows:

*Change of color indistinct except when using more of the indicator than prescribed.

| | Gravimetric. | Volumetric. |
|---|---|---|
| Brazil wood | 0·96 | 0·87 |
| Cochineal | 0·92 | 0·887 |
| Hæmatoxylon | 0·97 | 0·893 |
| Average | 0·95 | 0·883 |

The differences here amounted to: gravimetric, 0·079 per cent.; volumetric, 0·069 per cent. These variations appeared too great, so it was decided to do the work in a reverse manner, that is, Professor Lloyd apply less agitation and Mr. Kebler more. Professor Lloyd, by reducing his shaking to three-quarters of an hour, and Mr. Kebler by agitating two hours continuously, with the same coca leaf, obtained somewhat different results:

| | Lloyd. | | Kebler. | |
|---|---|---|---|---|
| | Gravimetric. | Volumetric. | Gravimetric. | Volumetric. |
| Brazil wood | 1·034 | 0·950 | 1·02 | 0·91 |
| Cochineal | 1·004 | 0·939 | 0·99 | 0·89 |
| Hæmatoxylon | 0 976 | 0·934 | 1·03 | 0·94 |
| Average | 1·005 | 0·941 | 1·01 | 0·91 |

On comparing these results with those obtained above, we come to the conclusion that time of agitation does seem to increase the percentage of yield, to some extent, and this fact should be borne in mind when parallel assays are made. While the above data are not in complete accord, yet they approximate one another as closely as can be expected for this character of work, and are considered quite satisfactory by the workers.

LYMAN F. KEBLER, Chairman.

The report was received and ordered to take the usual course.

The reading of the report of the Committee on Research was deferred till the evening session, as was also the report of the Committee on the Revision of the United States Pharmacopœia.

The next business was the nomination of the officers for the Section during the coming year. Messrs. Kremers and Alpers were put in nomination for Chairman, and Mr. Kaufmann for Secretary.

The reading of certain papers presented by members in attendance were carried over to the evening session, so as to allow discussion on the subjects by a larger audience. The following papers were then read by title:

## STANDARDS FOR LINSEED AND WHITE AND BLACK MUSTARD SEEDS.

BY J. U. LLOYD.

## COMPARATIVE STRUCTURE OF HYOSCYAMUS, BELLADONNA AND STRAMONIUM LEAVES.

BY J. O. SCHLOTTERBECK.

## EXAMINATION OF POWDERED VEGETABLE DRUGS.

BY HENRY KRAEMER.

## SULPHUR PRECIPITATUM.

BY T. D. REED.

## IS GLUCOSE OR GRAPE SUGAR OF ANY VALUE AS A PRESERVATIVE IN SYRUP OF HYDRIODIC ACID AND SYRUP OF FERROUS IODIDE?

BY DAVID WALKER.

## GELSEMIC ACID.

BY VIRGIL COBLENTZ.

This paper is printed in full on page 439.

## A CHEMICAL BIBLIOGRAPHY OF MORPHINE.

BY A. B. PRESCOTT AND H. E. BROWN.

By special action, a paper on

## THE EFFECT OF TEMPERATURE UPON PERCOLATION.

BY H. DEFORREST SMITH,

a non-member, was received. These papers were referred to the Publication Committee. On motion, the meeting adjourned at 10 A.M. Immediately after this action the

### SECOND SESSION OF THE SCIENTIFIC SECTION

was convened by the Chairman. The reading of the minutes of the first session was dispensed with. On account of the small number of members in attendance, the election of officers was postponed until the evening session, and at 10.07 A.M. the second session adjourned, so the audience could overtake the trolley party.

The

### THIRD SESSION OF THE SCIENTIFIC SECTION

was called to order by Chairman Alpers at 8.30 P.M., on Thursday, August 26th. Upon motion, the reading of the minutes of the second session was dispensed with. Prof. Good then took the chair, while Mr. Alpers read his address. In reply to the remark not infrequently heard, "Pharmacy has ceased to be a science; it is a mere trade, and a poor one at that," the author discussed the topic: "Is there Science in Pharmacy?" He believed that the commercial admixture in American pharmacy predominates over the scientific part to such an extent that the latter is nearly or entirely concealed.

Driven by competition into a state of nervous agitation, often bordering on recklessness, he thought it no wonder that pharmacists sometimes ignored their professional standing, and plunged into the strife for mere commercial supremacy; and, said the speaker, what is the worst sign of the times from the point of view of the question—"Is there Science in Pharmacy?"—is that the men who conduct their business on these lines are, as a rule, the most successful ones, if the gaining of wealth is to be the sole evidence of success. He pointed to the well-known fact that many pharmacists do not make the preparations and chemicals which they handle, and mainly because of the capital required for investment, and because of the protection which copyright laws provide for so many articles in use at present. He said the time is fast approaching when the pharmo-chemical and pharmacal manufacturing industries, with their boundless array of capital and superior resources, will have rendered the pharmacist's modest laboratory, in every productive direction, not only wholly superfluous, but, indeed, absurd.

He said science in pharmacy is to-day like the princess in the fairy tale, lying spellbound under noxious weeds and thorns, awaiting her delivery. He foresaw a division of pharmacists into two classes, not hostile to each other, but mutual coadjutors in their respective lines of work, and supplementing one another. One class is to look after the purely commercial side of the drug business as now conducted, and handle the so-called "side lines," while the scientific part of pharmacy is to be conducted by those who fit themselves for the compounding of prescriptions, the sale of drugs, the assaying and standard-

izing of drugs, the analysis of foods, medicines, secretions, etc , and who have perfected themselves by higher education in the use of the microscope as a means of diagnosis, and also in bacteriology, which is being more used every day by physicians in order to study diseases. He said it is impossible for the physician to charge himself with this work on account of his inability to give it the constant attention it often needs, and that it will find its way to those prepared to do it. He thought it a field of desirable activity, and stated that it was still largely unclaimed, and that the pharmacist should enter it. Then the analyst-pharmacist would be a connecting link between the laity and the medical profession, indispensable to both, a constant searcher for truth, a once more truly professional man, far from priding himself on successful competition with the "general store" in the favor of the sidewalk public. To regulate and enforce the proposed measures, the Chairman recommended that a Department of Health be created. He proposed that it be made national in function if the Constitution of the United States would permit; otherwise that funds be appropriated by the Government for its support. He referred to the fact that the medical press had recently suggested such a measure, and that Senator Mallory, of Florida, had already introduced a bill in the Senate for the establishment of such a department. The speaker believed an institution of the foregoing character would afford relief from the many disadvantages and drawbacks caused in medicine and pharmacy by the confusing multitude of State laws. He believed the American Pharmaceutical Association should assume leadership in such a new departure, and he recommended that a committee be appointed either by the Scientific Section or by the Association, to whom this matter should then first be referred, to examine the bill introduced by Senator Mallory, and to confer with its author for the purpose of procuring for pharmacy and its subsidiary sciences proper recognition and representation in the proposed National Department of Public Health; or, if this bill should fail, to take steps on the introduction of a new bill. The address was received with the thanks of the Association, and was referred to the Section on Pharmaceutical Education and Legislation for discussion. The following paper, from the Special Research Committee, was then presented:

## THE CAFFEIN COMPOUND IN KOLA. PART II. KOLATANNIN.

By A. B. Prescott and J. W. T. Knox.

Continuing the work reported on at the meeting a year ago, the authors find all the tannin of the kola nut, that combined with caffein and that uncombined, to be a single chemical individual, distinct from any tannin previously reported as found in the beverage plants or elsewhere. The "free" kolatannin was prepared as follows: Fresh kola nuts were sliced into boiling alcohol (to prevent the formation of the colored body which would otherwise appear), removed after a few minutes' boiling, and dried in a current of warm air, then ground to a No. 20 powder and packed in a percolator. The alcohol so used in sterilizing the drug was diluted to about 50 per cent. strength, and employed as a menstruum, with addition of sufficient dilute alcohol to complete the extraction. The highly colored extract of kola thus obtained was concentrated by distillation in vacuo, until the alcohol was all removed. The contents of the flask were then filtered, the insoluble portion being chiefly caffein kolatannate, while the solution contained caffein, kolatannin, caffein kolatannate, glu-

cose, traces of fatty matter, coloring matter, and more or less colored derivatives of tannin, according to whether the sterilization by boiling alcohol has been properly done. Common salt was then added to this filtrate to saturation and the caffein kolatannate was completely precipitated. It was filtered out and added to the first residue of caffein kolatannate. The reddish-colored filtrate was then transferred to a large separatory funnel and agitated with chloroform repeatedly to remove alkaloids and the traces of fat. The dissolved chloroform was then separated by agitation with small portions of ether. Ethyl acetate was then added to the liquid in the funnel, and the liquid extracted with it as long as any tannin was removed. The united solutions of tannin in ethyl acetate were transferred to a distilling flask, and concentrated to dryness under reduced pressure. The tannin residue in the flask was a porous, pinkish mass, very friable, and easily and completely soluble in water. It was redissolved in saturated salt solution, filtered and again shaken out with ethyl acetate, which was distilled off in the way just described. The tannin residue was next dissolved in cold distilled water, and shaken out as before, this process being repeated as often as necessary. The final tannin residue, after the ethyl acetate had been removed as far as possible by distillation, was treated in the distilling flask with a small quantity of ether, which, after permeating the mass, was removed by distillation under reduced pressure, to remove the odor of ethyl acetate. The tannin was then transferred to a vacuum desiccator and kept over sulphuric acid for several days to remove the last traces of ethyl acetate. The kolatannin from caffein kolatannate was prepared by decomposing the purified salt with lead hydroxide. Freshly precipitated lead hydroxide, triturated to a smooth paste with warm alcohol, was added in excess to a warm solution of the caffein kolatannate in dilute alcohol. The mixture was warmed on a water bath for a few minutes, with stirring. The precipitate of lead kolatannate, mixed with the excess of lead hydroxide, was allowed to subside, the supernatant liquid removed and the precipitate washed repeatedly with dilute alcohol until all caffein was removed. The precipitate was then suspended in dilute alcohol and treated with hydrogen sulphide until the tannin was all liberated. The lead sulphide was removed by filtration, and the filtrate concentrated by distillation in vacuo to small volume. Eight or ten volumes of water were then added. This precipitated a reddish mass, a mixture of certain anhydrides of kolatannin, which was filtered out and set aside.

The filtrate containing tannin, together with dissolved anhydrides, was now shaken with ether once or twice, which was thrown away. Then ethyl acetate was added and the tannin separated and purified in the way already described under the method of preparation of free kolatannin. Kolatannin is a cream-colored powder, with a slight pinkish tinge. It is freely and completely soluble in water, alcohol, acetone and ethyl acetate, sparingly soluble in ether, insoluble in chloroform and in benzene. In properties and reactions with ferric salts, bromine and calcium hydroxide, it agrees with the "oak tannin group," not with the "gall tannin group." It precipitates metallic salts, alkaloids and albumen, and produces, with solution of formaldehyde in the presence of a condensing agent, as hydrochloric acid, a pink precipitate which becomes red. In empirical atomic composition it is homologous with the caffetannic acid of Hlasiwetz. It purifies to perfect constancy of composition, $C_{16}H_{20}O_8$, as found in repeated preparations. The results which

were obtained by the authors last year seemed to indicate that kolatannin was a glucosidal body; but after repeated experiments, in which the glucose of the plant was entirely eliminated from the tannin, negative results were obtained for glucose resulting from decomposition of the kolatannin, and the interpretation was made that kolatannin is not a glucoside. The authors said it is significant that this result places kolatannin in a category and gives it a character essentially different from the character of caffetannic acid as understood by the chemical world from the report of Hlasiwetz. In every case kolatannin yields at once a pentacetyl derivative; it readily admits successively three, four and five atoms of bromine in substitution for hydrogen, and these several bromine and acetyl substitutions are obtained just the same, whether the bromine substitution or the acetyl substitution be made first in order. A sixth atom of bromine can, with more difficulty, be introduced, but this product will at most receive only four groups of acetyl, forming tetracetylhexabromkolatannin. In analysis of the acetyl derivatives, the figures from combustion were confirmed by a method of saponification.

Kolatannin itself forms a first, a third and a fourth anhydride, and, like anhydrides, are formed by the several bromine derivatives, all these purifying intact, so as to give, on combustion, figures quite close to the theoretical ones. By boiling kolatannin with dilute acids, an insoluble "red" is obtained, in place of the "kola-red" of Knebel, and corresponding to the oak-red, and the phlobaphene of Grabowski, Etti and others, but with utmost efforts this body could not be prepared of constant composition.

The figures from six preparations ranged C, 50·45, 53·60, 56·38 per cent., etc. The authors believe it to be a mixture of two or more compounds. The report of Knebel and of Hilger that sugar is formed coincident with the red body was not confirmed by the present experiments. Kolatannin, under action of fused potassium hydroxide, was found to yield protocatechuic acid, as well as phloroglucin, indicating both di- and trihydroxy benzoic constitution. Protocatechuic acid was also obtained by heating with glycerine. The authors stated their desire to make further determinations of decomposition products of kolatannin, and proposed, for further studies, the following constitutional formula, which they think is consistent with the results so far obtained:

$$\begin{array}{l} C_6H_3(CH_3)(OH)_3CO \\ C_6H_3(CH_3)(OCH_3)(OH)_2O \end{array} = C_{16}H_{20}O_8$$

The authors also discussed the two processes for the assay of kola which have been proposed in the past year by Jean and Carles. They gave the essential points of these methods as follows: *Method of Jean.*—This author boils the dried and powdered drug with milk of lime, dries the whole in an oven and powders it again. This powder is exhausted with chloroform, which removes the free alkaloids. The chloroform is evaporated to dryness, the residue dissolved in hot water and filtered. The filtrate is evaporated to dryness and weighed as caffein. For "kolanin:" the drug, after treatment with chloroform, is extracted with alcohol, the alcohol evaporated from the percolate, and the soft extract remaining is dissolved in boiling water, which solution, after cooling, is filtered. The insoluble matter remaining in the filter is dried in an oven and weighed as "kolanin."

The authors, in criticising the foregoing methods, state that the most serious

defects are: (1) the boiling with milk of lime, (2) prolonged heating necessary to dry the drug after that treatment, (3) weighing the caffein instead of estimating it with Wagner's reagent volumetrically, (4) the means employed to separate the so-called "kolanin," (5) estimating caffein kolatannate, "kolanin," by weight as such instead of by its caffein content. (1) Boiling with milk of lime or other aqueous alkalies tends to decompose caffein itself and to liberate caffein from its tannate, and thus prevent an exact determination of the proportion of "free" to combined alkaloids that originally existed in the drug. The starch of kola, amounting to nearly 40 per cent., causes the drug to become of a jelly-like consistency when boiled with aqueous liquids, and when dried the mass is very difficult to powder, and even when powdered the condition of it is well calculated to resist the penetrating action of the solvent, and thus cause incomplete extraction. (2) The gelatinous condition of the drug after boiling with lime water renders it hard to dry completely, and as very prolonged heating is necessary, there is danger of loss of caffein by sublimation. (3) We do not consider that the alkaloids of kola are sufficiently pure when removed in this manner to be weighed as such. Gomberg's volumetric method gives more accurate results. (4) If any caffein kolatannate escapes decomposition during the first part of the assay, which will occasionally happen, it is removed by the extraction with alcohol. But as it is somewhat soluble in water and more soluble in aqueous solutions containing tannin, the directions to collect and weigh the portion left undissolved by water will generally be found superfluous, for the small amount of it present will generally pass into and remain in solution. Dieterich had this experience and met with nothing but disappointment in trying to estimate caffein kolatannate by this method. (5) Caffein kolatannate has been shown to be a body of somewhat variable composition, with a caffein content ranging from 19 to 25 per cent. Inasmuch as the value of kola as a stimulant depends primarily on its percentage of caffein, and as the weight of its caffein compound indicates only approximately the amount of its combined caffein, there would not seem to be any reason for attaching much importance to the weight of this compound if a very precise valuation of the drug is desired. We hold that a direct estimation of the caffein of this compound is preferable, and, at least, as expeditious.

*Method of Carles.*—Ten grammes of kola, 1 gramme of calcium hydroxide, and 20 grammes of 80 per cent. alcohol, are mixed together and dried on the water-bath until the weight is reduced to 14 grammes. The mixture is then powdered and transferred to a 100 c.c. flask containing 35 c.c. of a mixture of 100 parts of chloroform and 20 parts of alcohol, and heated for one hour on a water-bath. After filtration, the residue is extracted next with 20 c.c. of the same solvent, and finally with 10 c.c. The united extracts are evaporated to dryness and the residue taken up with 10 c.c. of boiling water, containing four or five drops of 1 per cent. sulphuric acid, then with 6 c.c., and finally with 5 c.c. The solutions are united, filtered, evaporated to constant weight and weighed as caffein. For "kolanin," which the author recognizes as caffein kolatannate, another sample of the drug is taken and extracted with water to remove the caffein and other soluble constituents. The drug is next extracted with 70 per cent. alcohol, the extract evaporated to dryness, transferred to a filter, washed with cold water, then dried by a gentle heat and weighed. If it is

desired to estimate the alkaloids of this compound, 1 gramme of "kolanin," 1 gramme of calcium hydroxide, and 3 grammes of chalk, with a little 70 per cent. alcohol, are mixed together, and evaporated on the water-bath to about 6 grammes and extracted with alcoholic chloroform in the manner already described. The objections to this method are in part among those already mentioned in the discussion of Jean's method. The use of lime or other alkalies in the assay of a caffein-bearing drug is to be deprecated. The solvent used is not a proper one, for the reason that sufficient alcohol is present to extract other constituents, in addition to the alkaloids, which are not removed from caffein during the subsequent treatment of the residue, and which when weighed with the caffein lead to erroneous results. Moreover, the manner of applying the menstruum is inconvenient, does not insure complete extraction, and is in no way preferable to the ordinary extraction by the use of Soxhlet's apparatus. The addition of the sulphuric acid is unnecessary, and does not add to the purity of the final product, which is dark-colored and very plainly impure. The objection to weighing a final residue as caffein finds especial application in this method. As the properties of caffein kolatannate had not been made known very generally at the time of publication of these methods, there is some excuse for the assumption of both these writers, that it is wholly insoluble. Carles has proceeded on this hypothesis, in directing the drug to be extracted with cold water, to remove the water-soluble constituents before exhausting it with alcohol to remove the caffein compound; but inasmuch as caffein kolatannate is not only somewhat soluble in water, but considerably more soluble in solutions of caffein and of tannin, the extraction of kola by water will remove a considerable amount of it. The same is to be said of the final washing of the caffein compound with water, which is quite inadmissible in quantitative work. Carles seems to have recognized the uncertain value of gravimetric determinations of caffein kolatannate, and is to be commended for offering an alternate method providing for its valuation according to the amount of its alkaloids. Both methods give very low results as compared with those obtained by the method proposed at the meeting last year by the authors. The paper was received and referred to the Publication Committee. During the discussion that followed, Prof. Kremers referred to a late contribution to the knowledge of the tannin of coffee by Kuntz-Krause, in which caffetannic acid is said to be a glucoside.

The subject of the next paper was:

## WHY A PHARMACIST SHOULD BE A BACTERIOLOGIST.

By O. W. Krueger.

He said because physicians are employing bacteriology more and more as a means in determining the nature of diseases and the selection of proper remedies, and because they do not possess the required laboratories and apparatus which the pharmacist should always have; therefore, and in order to be an up-to-date co-worker with an up-to-date physician, a pharmacist should be a bacteriologist.

The paper was discussed by Messrs. Whelpley, Alpers, Prescott and Hallberg. It was received and referred to the Publication Committee. Then followed the report of Professor Kremers, a member of the Special Research Committee, on the volatile oils which were considered last year in the report

of the Committee on Revision of the U. S. Pharmacopœia. He mentioned the ambiguity of the term "volatile oil," and spoke of the care that should be used in deciding on the particular constituent by the estimation of which it is sought to value the oil. The report was received and referred to the Publication Committee. The second annual report of the Research Committee was then presented by Chairman Prescott. It considered the pharmaceutical assay of and the limitations of the percentage of essential constituents of volatile oils at large. The Chairman also reported that the constitution of commercial oil of bay was under investigation by a member of the committee. The following subjects were also reported by him as under investigation: Standards for Linseed and White and Black Mustard Seed; (he reported that Professor Lloyd had accepted this subject so far as the mustard seed were concerned;) standardization of Powdered Acacia and Gamboge, giving Limitations for the Amount of Starch Allowable; Investigation of Syrups Made with Cane Sugar, and a report on the desirability of using glycerin in place of cane sugar in syrups; (the chairman of the committee had done something toward working this subject;) the Chemistry of Cascara Sagrada; (Dr. Dohme is investigating this matter;) Chemistry of Taraxacum; (Professor Sayre has this subject;) the Perhalides of Alkaloids in Relation to their Volumetric Estimation; (the chairman has this;) Toxic Action of Phenol on Living Plants; (under the supervision of Professor Kremers;) Comparative Structure of Hyoscyamus, Belladonna and Stramonium Leaves; (assigned to J. O. Schlotterbeck;) A Chemical Bibliography of Morphine from 1875 to 1896; (compiled by H. E. Brown.) The report was received and approved. The thanks of the Section were extended the committee. The Secretary was then asked to cast an affirmative ballot in order to elect Messrs. Kremers and Dohme members of the Special Research Committee for a term of two years and to fill the vacancies of Messrs. Kremers and Coblentz, whose terms had expired. Professor Good moved that the chairman of the committee be empowered to fill any vacancy in the committee until the next meeting, should one occur in the intervals of the meetings. The following two papers from the Special Research Committee were then read in abstract, received and referred to the Publication Committee:

## ALKYL BISMUTH IODIDES.

By A. B. Prescott.

The paper dealt with the theories of the structure of this class of compounds and with work upon bismuth iodides of nitrogen bases, both of fatty alkyls and those of pyridine and pyridine-derived alkaloids. The interest attached to pharmacy in the paper laid in the fact that the alkaloidal bismuth iodides were shown not to be quantitatively uniform enough to be entirely satisfactory for alkaloidal assay, but were shown to be more stable and uniform than the alkaloid mercuric iodides formed by Mayer's reagent. On the other hand, they are more bulky, less easy to gather into compact mass, and less manageable in filtration. On the whole, the author believed that the use of Dragendorff's reagent (potassium bismuth iodide) for alkaloidal assay affords no general advantages over that of Mayer, which is well known to be unsatisfactory.

Following this paper came one on

## ARALIA NUDICAULIS.

BY WILLIAM C. ALPERS AND BENJAMIN L. MURRAY.

The botany of the entire plant, and the microscopy, chemistry and pharmaceutical preparations of the rhizome were treated. Drawings of a cross-section of the corky layer of the old bark, a longitudinal section of the outer bark, also one of the wood from pith to bark, and a segmentary cross-section of the entire root showing pitted vessels, lignified cells, cork cells, medullary rays, medullary rays prolonged into bark, cambium layer, resin and oil cells, phellogen, bark, wood and pith, accompanied the paper.

As a summary of the systematic analysis and estimation of the constituents, the following table was presented :

| Extract with | Percentage of Dry Drug. | Containing |
|---|---|---|
| Chloroform . . . . . . . . | 3·38 | Resin, 3·05 per cent.; oil, 0·33 per cent. |
| Alcohol, 80 per cent. . . . | 8·75 | Tannin ; organic acid ; acid resin (neutral resin?) |
| Water . . . . . . . . . . . | 3·58 | Albuminous bodies ; coloring matter. |
| Acid ½, water ½ . . . . . . | 56·10 | Mucilaginous matter. |
| Alkaline solution . . . . | 6·89 | Crude fibres, etc. |
| (By subtraction) . . . . . | 21·30 | Cellulose. |
| | 100·00 | |

Regarding the pharmaceutical preparations, the authors said a quantity of the fresh rhizome gathered in the fall was digested with alcohol, according to the directions of the Pharmacopœia for making fresh tinctures. This tincture, after standing nearly a year, exposed to the varying temperatures of winter and summer, showed no precipitate, and possessed the odor and taste of the plant. Mixed with water it formed a milky precipitate, indicating the presence of oil and resin. It had a beautiful gold-yellow color, which seems to be permanent. A fluid extract was prepared from the rhizome gathered in the spring. A menstruum of four parts of alcohol and one of water was used, and the general directions of the Pharmacopœia for making fluid extracts were followed. The evaporization of the second percolate was performed at a very low temperature, in order not to drive off oily or resinous parts. The fluid extract resembled the tincture, but is darker, owing to the solution of the coloring matter of the plant, and more aromatic.

Although this fluid extract appears to be an elegant and highly concentrated preparation, and to possess all the properties of the drug, it is doubtful, in the writers' minds, if therapeutically it would be the most desirable form of administering the drug. The virtues of the drug depend, they believe, on the oil and resins. The properties of the drug, judging from some crude experiments, seemed to be stimulant, diaphoretic and probably neurotic.

Professors Sayre and Lloyd spoke of the compound syrup of aralia being used as an alterative by the Eclectics, instead of the compound syrup of sarsaparilla.

Mr. Alpers said he had been unable to procure Aralia nudicaulis in the market, but that each time he had ordered it another drug had been sent. In

explanation of this, Prof. Lloyd said that what Mr. Alpers had received when he ordered Aralia nudicaulis was probably Aralia hispida; and he also said that the Eclectics have carefully distinguished between the two, and that they refuse to accept spikenard for the plant under consideration.

By a special action the report of the Committee on Revision of the United States Pharmacopœia was presented at this stage by Chairman Eliel, who said in effect:

*Podophyllum.*—As podophyllin is the active principle, a podophyllin requirement should be established. As the process of assaying the drug and obtaining the purified Podophyllin, U.S P., is a simple one, it should be adopted as such, or in a modified form. Four per cent. of purified U.S.P. podophyllin appears to be an average good yield from resinous prime root.

*Prunus Virginiana.*—It has been established that wild cherry bark can readily be assayed and its value be determined A process of assay should therefore be adopted and a standard hydrocyanic acid requirement be established.

*Sanguinaria.*—Blood root has an active principle, sanguinarine, and as this can readily be determined, a process of assay should be adopted, and a sanguinarine requirement established.

*Sarsaparilla, Quillaja* and *Senega* have similar properties, and their active principles are similar and allied. These principles should be investigated and closely compared. Methods of assay and standard requirements should be established so as to give pharmacists a means of determining their merits and value independently of the crude microscopical methods now necessarily and only employed, and which can have no real value. If, as has been maintained, soap bark and senega root have the same therapeutic value, and can be interchanged, the more valuable one should be determined and adopted, and the less valuable one dropped.

*Strophanthus.*—The most valuable variety of this drug should be adopted and the less valuable varieties excluded by the Pharmacopœia, and a method of assay for determining the strophanthin adopted, as well as a minimum content of the same.

*Syrupus Acidi Hydriodici* is not a stable preparation, and it is doubtful if it can be made such. A concentrated solution of hydriodic acid can be made that is stable, and from which the syrup can be made as wanted for dispensing. Such a solution should be substituted for the syrup. Prof. Ryan suggested, if the syrup be continued, that its strength be increased.

*Syrup of Garlic.*—This syrup is practically obsolete, as far as usefulness is concerned, and should be dropped; but if retained in the Pharmacopœia, the quantity of dilute acetic acid should be reduced, for if made with a good quality of garlic, the finished product, according to quantities now directed to be used, will yield about 100 c.c. more than the 1000 c.c. that the Pharmacopœia directs.

*Vanillin* has been recognized as the odoriferous and valuable principle of vanilla beans, and is a definite chemical compound whose purity can readily be determined. It should be made official, especially as its use is becoming general among pharmacists.

*Mucilago Acaciæ* may be kept for an indefinite time if 25 per cent. of the water directed to be used is replaced with liquor calcis, and we recommend its adoption in the Pharmacopœia.

*Tinctura Moschi.*—The pharmacopœial requirement of 5 per cent. strength is too great and wasteful, as this amount of musk will not be exhausted by the process now directed. The strength should be reduced to 2 per cent. and 100 c.c. of the water replaced by liquor calcis.

*Methyl Alcohol* may now be obtained of a high degree of purity, and the use of such purified wood alcohol should be sanctioned in the manufacture of such preparations as linimentum saponis, linimentum saponis mollis, linimentum sinapis compositum, spiritus myrciæ, tinctura arnicæ florum, tinctura benzoini, tinctura cantharidis and tinctura iodi. Samples of these preparations made with purified wood alcohol were submitted for inspection by Mr. Eliel.

It was the intention to submit at this meeting a line of samples of fluid and solid extracts of alkaloidal drugs with wood alcohol as a solvent, but in order to obtain trustworthy results, the committee found that individual experiments have to be repeated a great many times. The practicability of using methyl alcohol in the manufacture of alkaloidal solid extracts was tested on the following drugs:

Aconite, belladonna, cinchona, henbane and stramonium. Methyl alcohol does wholly extract the alkaloids of these drugs.

In the cases of aconite, belladonna and nux vomica, the volume of menstruum for complete exhaustion was ascertained. Two portions of the drug (100 gm. each) were packed in separate percolators and were exhausted under the same conditions and at the same rate of flow, one portion being exhausted with official menstruum, the other with a menstruum differing from the official in containing purified methyl alcohol in place of official ethyl alcohol.

The percolation was conducted with ordinary percolators, and in the manner ordinarily employed in retail stores, who follow the specifications of the U.S.P.

The results were as follows:

| | Volume of menstruum required for complete exhaustion. | |
|---|---|---|
| Drug. | Ethyl Alcohol Menstruum. | Methyl Alcohol Menstruum. |
| Aconite | 450 c.c. | 550 c.c. |
| Belladonna | 695 c.c. | 700 c.c. |
| Nux vomica | 950 c.c. | 1060 c.c. |

The first and the second 100 c.c. of percolate were assayed for total alkaloids, with the following results:

| Drug. | First 100 c.c. of Ethyl Alcohol Percolate. | First 100 c.c. of Methyl Alcohol Percolate. |
|---|---|---|
| Aconite | 0·49 gm. | 0·43 gm. |
| Belladonna | 0·437 gm. | 0·458 gm. |
| Nux vomica | 1·437 gm. | 1·427 gm. |

| Drug. | Second 100 c.c. of Ethyl Alcohol Percolate. | Second 100 c.c. of Methyl Alcohol Percolate. |
|---|---|---|
| Aconite | 0·135 gm. | 0·135 gm. |
| Belladonna | ·0578 gm. | ·04814 gm. |
| Nux vomica | ·733 gm. | ·668 gm. |

The solvent power of methyl alcohol for non-alkaloidal plant constituents is not identical with the solvent power of ethyl alcohol. As a consequence, the mass of extract obtained from a given quantity of drug is not the same as that obtained from the same quantity of drug by means of an ethyl alcohol menstruum. The dose of the extract would, therefore, have to be ascertained and, perhaps, changed if methyl alcohol be adopted as the solvent.

The weights of extract, calculated as *pilular* extract, obtained from 100 gm. of drug by completely exhausting 100 gm. of drug with the ethyl alcohol menstruum and with the methyl alcohol menstruum, were :

| Drug. | Ethyl Alcohol Extract. | Methyl Alcohol Extract. |
|---|---|---|
| Aconite . . . . . . . . . | 7·57 gm. | 14 gm. |
| Belladonna . . . . . . | 54 gm. | 25·708 gm. |
| Nux vomica . . . . . | 12·55 gm. | 20·4 gm. |
| Cinchona . . . . . . . . | 54·62 gm. | 53·134 gm. |

The Committee stated they had made arrangements for further work on this subject.

The toxicity of methyl alcohol was discussed by several of the members. Mr. Puckner reported having taken 30 c.c. of a purified methyl alcohol, with a slight increase in pulse and temperature as the only results. On other occasions he took 15 c.c. every three hours with the same effect. He believed methyl, ethyl and propyl alcohols are all about alike in their physiological effects. Prof. Kremers pointed out that it had been determined that the toxicity of alcohols of the paraffin series increases with the number of carbon atoms; and he said, if this was true, methyl alcohol must be less toxic than ethyl alcohol. Contrary to all this, Prof. Hallberg reported a case where two persons had died from the drinking of 10 ounces of commercial methyl alcohol. It was the opinion of some present that the same amount of ethyl alcohol might have caused the same result. The members differed in their experience with the so-called "Columbian Spirit." Some had found it to contain acetone, while others had not. Prof. Hallberg said that tincture of iodine made with purified methyl alcohol became colorless, or nearly so, on standing, while Mr. Ebert said he had a sample of that tincture made in January, and that it had not lost color. The report was received and referred to the Publication Committee. A paper on

## PEANUT OIL.

By S. P. Sadtler,

was then read.

The author dealt with the source and preparation of the oil. He stated the results of his analysis of the oil of Virginia peanuts in tabular form, and also placed alongside for comparison some partial analyses of peanut oil from foreign sources, as follows :

| | Oil from Virginia Nuts. | Oil from Spanish Nuts. | Oil from African Nuts. | Oil from Puducheri. | Commercial Oil. |
|---|---|---|---|---|---|
| Specific gravity at 15° C. | 0·917 | 0·9175 | 0·911 | 0·920 | 0·9209 |
| Saponification value | 192·53 | 190·68 | 194· | 193·1 | 192·1 |
| Iodine value | 91·75 | 94·17 | 85·6 | 95· | 98·4 |
| Hehner value (Percentage of insoluble acids) | 94·87 | 95·31 | — | — | 95·86 |
| Reichert-Meissl value | 0·484 | 1·60 | — | — | — |
| Percentage of free acid as oleic | 0·546 | 0·791 | 0·62 | — | 6·20 |
| Cold test of the oil | + 3° C. | + 3° C. | + 2° C. | — | + 10° C. |
| Maumené Test | 56·75° C. | — | — | 49° C. | 45·5° C. |
| Melting point of fatty acids | 29° C. | 34° C. | 30° C. | 29° C. | 28° C. |
| Solidifying point of fatty acids | 27·5° C. | 32·5° C. | 29° C. | 25° C. | 25° C. |

He also said the production of peanut oil in this country has hitherto been, unless secretly, only carried on in a desultory way, and it has not been much known as a commercial article. However, as the chemical composition of the peanut has become better known, attention has been drawn to the food value of the peanut meal and the peanut grits. It has been found that they are richer in nitrogenous principles than any of the vegetable seed cakes, and a demand has sprung up for them. So the expression of the oil has now been undertaken on a larger scale and with more suitably designed presses.

The sample which was shown was cold-pressed oil from Virginia peanuts, and about 38 per cent. by weight is obtained in the first cold-pressing. By a second hot-pressing nearly 10 per cent. more can be obtained. The cold-pressed oil is, as seen, of a pale yellow color, and of pleasant flavor and odor. A very slight refining makes from it a very agreeable table oil for salads and general culinary purposes. It has already been noted with the European peanut oil (and the author said he could confirm it from his experiments with the American oil) that, when once freed from the free acid found in the raw state, it does not tend to become rancid as easily as olive oil. The author said he had exposed samples to strong sunlight for weeks without developing the slightest rancidity.

Now, asked the author, as this is an abundant American product (the annual product of Virginia and North Carolina peanuts is over two million bushels), why should the oil not be used in pharmacy where olive oil is now used? The investigator had prepared, in an experimental way, a soda soap from this oil, a sample of which was shown, and a sample of lead plaster from the same. With this latter for comparison was put lead plaster, made from a sample of pure California olive oil. He thought these showed that the peanut oil will make at least as good products as the official olive oil.

As regards the soap, it is an open secret that the bulk of the castile soap made in Marseilles to-day is made from African peanut oil.

The author said, in conclusion, that when he asked permission of the company, who are now starting in to manufacture this oil in this country, to

present an account of his examination of the oil before the Association, he was told that they would cheerfully send samples of the oil in response to inquiries from any one interested. He stated the cost of peanut oil is much below that of olive oil.

The paper was followed by some

## PRACTICAL NOTES.

By Joseph Feil.

A series of experiments indicated to the author that under the ordinary conditions of most drug stores, tincture of iodine will remain of U.S.P. strength for about one month—that is to say, if the bottle is opened once or twice a day, and if kept on a shelf exposed to diffused daylight; if, however, the container is kept in a dark closet, exposed to the same conditions of occasionally being opened, it remains unchanged for two months. The author suggested that the Pharmacopœia require the preparation to be kept in a dark place.

In regard to the variation in strength of tincture of opium, he stated that inquiry seemed to clearly indicate careless manipulation in the preparation of the tincture as almost the only reason for this condition of affairs.

The author stated that powdered cinchona of a quality far exceeding U.S.P. requirements is readily obtainable at a moderate price, yet the ordinary article is only 50 to 70 per cent. of what it should be in alkaloidal strength. He believed a possible cure for this condition of affairs would be a shorter method of assay for the drug, if it is possible to devise one, even if it does not give absolute results.

The writer said although the U.S.P. recommends excellent wines, such as California Reisling and Ohio catawba, from which to prepare the vina, yet the favorite article used extensively to-day is sherry wine, an article notoriously impure. He found pharmacists consider the preparations made by the latter as better. He considered this doubtful, and added that he had failed to find any proof that the newer wines make better preparations; undoubtedly they are purer, but this does not prove that for medicinal purposes they are better, unless clinical evidence can be shown to this effect.

In the discussion that followed the reading of the paper, Mr. Payne referred to the frequent habit of some druggists making the tincture of opium from the gum opium instead of from an equal weight of the powdered drug, as the probable cause of the varying strength. Professor Hemm stated that he had obtained the strongest tincture by using maceration instead of percolation. He believed that the calcium phosphate of the official method was often a disturbing feature that prevented solution of the morphine, possibly through being alkaline in reaction, and therefore causing the alkaloid to be liberated from its salts and remain undissolved. He said if this did not account for the deficiency in strength the official process of percolation must yield an incomplete extraction. Professor Hallberg spoke of the use of granulated opium with the omission of calcium phosphate in the process of maceration with water as having been reported on favorably by many pharmacists. Regarding Mr. Feil's note on wines, Dr. A. B. Lyons spoke of the necessity of using wines containing 16 per cent. of alcohol instead of 12 per cent, if permanent preparations were desired.

## CHEMICAL COMPOSITION OF COMMERCIAL EXTRACT OF WITCH-HAZEL.

By Joseph Feil, Ph.G.

The author gave the tests by which he found what was believed to be protocatechuic acid, and he considered that substance to represent the peculiar properties of extract of witch-hazel. The extractive matter found averaged about 1 part in 3,000 parts of the liquid.

These papers were referred to the Publication Committee.

A paper entitled

## BOILER-SHOP PHARMACY.

By C. S. N. Hallberg,

was then read. The author had tabulated the percentage of disintegration and solution in acid and alkaline aqueous liquids of mass-made pills and friable pills. The results were in favor of the former kind. After considerable discussion by Messrs. Caspari, Werner, Kuhn, Payne, Sayre, Whelpley, Hallberg, Lyons, Good and Prescott, as to the propriety of the title and contents of the paper, it was referred to the Publication Committee and business again proceeded.

## SOME MEDICINES OF THE SWAMPY CREE INDIANS OF THE NORTH.

By C. Flexon,

was then presented. The paper gave some particulars furnished by Mr. Strath, Medical Officer at Norway House, which is located about 400 miles north of Winnepeg, Manitoba. These Indians administer most of their medicines in the form of infusions. A combination of malefern, senna and wild indigo is used for worms. Wild indigo is also used as an antiseptic. Calamus is used as a specific in all throat troubles, except diphtheria, which, however, is not known to them. The calamus is chewed and the saliva swallowed. The Indians are not easily induced to gargle. Great difficulty is also experienced in getting them to take the salts. Pills, however, are swallowed with a relish. Podophyllum, spearmint, sarsaparilla and dandelion are used by them. Caraway is used as a remedy for colic. Blue cohosh is used in obstetrics and female complaints, also for the production of abortion, in which case it is mixed with an unknown powder; an oil from a mixture of hemlock spruce, poplar and black birch is used for the same purpose. Cypripedium is used for rheumatism; the Indians will not take salicin or salicylates. Hedeoma is given as an aromatic stimulant and to produce abortion. Plantain is chewed and applied by the doctor in the form of paste as a hæmostatic; willow bark is used for the same purpose. Juniper berries are used as a diuretic; the leaves are dried and dusted over indolent sores; the root is infused and given for gravel. The rotten interior of the hemlock spruce is used as an agreeable absorbent toilet powder. The Crees believe that fever can only be cured by vomiting it up, and the powdered rhizome and rootlets of Veratrum viride are used to produce vomiting to relieve fever. The same medicine is used as a snuff to reduce hernia; to do this the naked patient is elevated to a horizontal position; he then takes a pinch of the snuff and during the intense sneezing which follows, a companion standing ready at the side plunges back the rupture with his fist. It is said that if it be not a strangulated case, the treatment is sufficient. Gunpowder and lard in equal quantities are used for skin diseases.

Sturgeon oil is used in 1-ounce doses as a cathartic. Wild raspberry and willow bark are used for cholera infantum. Rumex is used as a laxative and for poultices. The Crees look upon wild carrot as their most fatal poison.

A paper entitled the

## PREPARATION OF FLUID EXTRACT OF WILD CHERRY FOR SYRUP.

By J. M. Good,

was read by title.

## THE IMPORTANT CONSTITUENTS OF TARAXACUM ROOT.

By L. E. Sayre,

was then read by the author. This work of Prof. Sayre on taraxacum has been that of several years past; but during the last two years he has connected this investigation with the work of the Special Research Committee of the Association. The author has come nearer crystallizing the bitter principle taraxacin than ever before. He does this from a solution in acetone, but the crystals are unstable; the presence of the least particle of moisture breaks them down into oleoresinous globules. He crystallized the fatty substance known as taraxacerin in the pure state and submitted it to ultimate analysis, which indicated the substance to have the empirical formula ($C_9H_{15}O_x$).

## THE PREPARATION OF SOLUBLE FERRIC PHOSPHATE.

By W. A. Puckner.

The following formula, aiming at the production of a preparation of less variable composition, as well as a simplification of the process, was submitted for trial and criticism:

SOLUBLE FERRIC PHOSPHATE.

| | |
|---|---|
| Ferrous sulphate, in clear crystals | 156 gm. |
| Sulphuric acid | 20 c.c. |
| Potassium chlorate | 12 gm. |
| Ammonia water | 340 c.c. |
| Citric acid | 120 gm. |
| Sodium phosphate, uneffloresced | 200 gm. |
| Water | A sufficient quantity. |

Add the sulphuric acid to 240 c.c. of water, contained in a glass or porcelain vessel, to this add the ferrous sulphate, warm gently until all is dissolved, then add the potassium chlorate and continue the heat for one-half hour, or until a drop of the solution added to potassium ferricyanide test solution no longer produces a distinct green or bluish-green color. Add this solution, slowly and with constant agitation, to the ammonia water contained in a suitable vessel; to this mixture add hot water 4,000 c.c., and allow to subside and, after one-half hour, decant or siphon off the clear supernatant liquid. To the residue add 2,000 c.c. hot water, allow to subside and decant; repeat this washing with six portions of hot water, allowing the last portion to subside for at least six hours or over night. Decant or siphon off the clear liquid as closely as possible, then add to the remaining magma the citric acid and the sodium phosphate, warm gently until solution results, and then evaporate on a water-bath at a temperature not exceeding 60° C., until the solution weighs 500 grammes, and spread it on plates of glass, so that, when dry, the salt may be obtained in scales.

To obtain a solution of which 2 c.c. are equivalent to 1 gramme of soluble ferric phosphate, U.S.P., 1890, evaporate on a water-bath at a temperature not exceeding 60° C. until the solution measures 500 c.c.

SELENIUM IN COMMERCIAL SULPHUR.

BY T. D. REED, M.D.,

and

SULPHUR PRECIPITATUM.

BY T. D. REED, M.D.

were then read by title, received and referred to the Publication Committee.

It was then moved to proceed with the election of officers for the Section during the coming year. Mr. Alpers withdrew his name, and the Secretary was ordered to cast a unanimous ballot for Prof. Kremers, of Madison, Wisconsin, as Chairman. Dr. A. B. Lyons, of Chicago, Ill., was then nominated for Secretary; nominations were closed, and the Secretary asked to ballot affirmatively for Dr. Lyons, who was thereafter declared elected. The election of Prof. Kremers to the Chairmanship having caused a vacancy in the Special Research Committee previously elected at the session (for the Chairman of the Section is an *ex officio* member of the said committee), Dr. A. B. Lyons was substituted. There being no reports of committees, the newly elected officers were installed, and a vote of thanks was given the retiring officers. It was moved and carried that the Chairman of the Scientific Section make such arrangements with the Chairman of the Section on Pharmaceutical Education and Legislation as to obtain time to deal with the unfinished business of the Scientific Section. The reading of the minutes was dispensed with, and on motion the Section adjourned.

## SECTION ON PHARMACEUTICAL LEGISLATION AND EDUCATION.

Chairman Hallberg called the section to order at 9.45 A.M., on Friday, August 27th. Professor Whelpley then took the chair while Professor Hallberg delivered his address. The speaker recommended that the State Boards of Pharmacy be again requested to send the Section one or more sets of the questions which they have asked applicants; that the orthography and pronunciation of chemical terms as adopted by the American Association for the Advancement of Science be reported on at the next meeting; that the feasibility of establishing a memorial to Hager be considered; that rules in detail for the conduction and working of the Section on Pharmaceutical Education and Legislation be presented at the next meeting for consideration and adoption. The address was received and referred to a committee composed of Messrs. Prescott, Parisen and Puckner. The Secretary of the Section then read his report, which gave the changes that have taken place in pharmacy laws during the past year, as well as other measures which have been proposed in the legislation of the affairs of pharmacy. Statistics regarding the number of registered and unregistered pharmacists in the United States were also presented. These showed that fewer applicants are registered on diploma every year. The author said there was a lack of interest in the work of gathering this information by some boards of pharmacy. Mr. Ebert proposed that, in order to obtain the necessary information, a circular letter be sent to the secretary of each board of pharmacy early in the year. The report was

received and referred to the Publication Committee, and Professor Beal was given a vote of thanks for his laborious work.

The report of the Committee on the Preliminary Education of Apprentices was referred back to the Committee on the Revision of Pharmacy Laws.

## A SUMMARY OF ANSWERS TO MAIN QUESTIONS OF THE COMMITTEE'S CIRCULAR OF INTERROGATORIES.

Compiled by C. S. N. Hallberg,

was read by that gentleman. This consisted of a tabulated statement of responses to questions regarding pharmacy laws, boards of pharmacy, requirements for registration, methods of registration, examinations, examination fees, registration of licenses, revocations, titles and privileges, poison laws and label provisions, adulteration, limited license and exemptions. Thirty-one replies expressing opinions were received from various boards, associations and schools of pharmacy. The paper was received and referred to the Publication Committee. Messrs. Hallberg and Beal were then nominated for the chairmanship of the Section for the ensuing year, while Messrs. Oldberg, Hallberg, Hereth, Beal, Whelpley, Puckner, Kaufmann, Mason and Webster were named for the secretaryship, and these names were posted until the second session of the Section.

The next business was the reading of a paper entitled

## SHOULD A PHARMACY LAW BE UNIFORM TERRITORIALLY?

By Edw. S. Dawson, Jr.

This paper was in answer to the query: "Should a pharmacy law be uniform in its application throughout the State, or should a distinction be made for smaller towns?"

The author gave his reasons for and against such applications, and concluded by saying: "I am of the opinion that a pharmacy law should be framed so as to secure greater protection to public health, and afford protection to the legitimate druggist up to a point where the cry of 'monopoly for the drug business' cannot be set up; but care should be taken that the druggist who receives the least benefit from the operation of the law should not have his hands legally fettered."

Following this was another, called

## SHOULD PHARMACISTS OR THE STATE SUPPORT THE PHARMACY LAW AND THE BOARD?

By H. M. Whitney.

The writer maintained that all examinations to secure a personal State certificate of registration, conveying a special and legalized position, with its rights and privileges, should be paid for by the applicant. But he believed that the enforcement of the pharmacy law, poison law, or any other special duty placed by the State upon the board should be supported and paid from the State treasury.

Professor Kremers suggested that the applicant be not allowed more than three opportunities to pass the examination. Mr. Ebert was opposed to pharmacists supporting the board unless the latter did more to enforce the law and detect adulteration. Mr. Mason believed two opportunities sufficient for an applicant to show his fitness for registration. Mr. Whitney said measures

would be taken in Massachusetts to limit the number of opportunities allowed the applicant. Messrs. Bartells and Webster also spoke on the subject.

A paper on

## PROVISIONS OF A POISON LAW, AND MEASURES FOR ITS ENFORCEMENT.

BY ALBERT B. PRESCOTT,

was then read. The author said the registration of sale of poisons is upon about the same footing that it was before the advent of State boards of pharmacy. It depends largely upon the will of the pharmacist. In this situation it seemed to the writer the better way, *first*, to propose, as a general State law upon this subject, one that is simple and moderate in its demands, and *second*, to undertake vigorous measures for the enforcement of registration laws.

In the provisions of the law, as to rules of registration of a given poison, the writer said he would adopt those of Number 79 of the Legislation Committee circular. He said it is of the first importance to the business interests of pharmacy that local druggists should all act alike in registration, and as to what articles to register. He suggested that the druggists of a town or city, if not organized into a society, might well call a meeting and confer upon what shall be the list of medicines to be always registered as poisons when sold without a prescription. Such an agreement gives a most satisfactory explanation to the purchaser, who may ask: "Why do I have to answer these questions here when I have not been asked the same at other places?"

As to the *second* named undertaking, that of vigorous measures for the enforcement of registration laws, it seemed to the author certain that this should be the duty of the State Board of Pharmacy.

The next paper presented was on

## UNIFORM PHARMACY LAW—AS TO PLACE OF REGISTRATION.

BY JOS. JACOBS.

The author thought it desirable that every licentiate should be required to register at the county seat of the county of his residence. This would be a wise provision, because it would make it clear to the licentiates themselves who were their legitimate co-workers, and the public at large could easily ascertain whether they were dealing with a pharmacist duly qualified or with an imposter. He suggested that the *place of registration* be designated in a clause similar to the following:

"All persons qualified by law to practice pharmacy in this State shall, before entering upon such practice, cause their names to be entered upon a book to be kept for that purpose in the office of the clerk of that court in which wills are filed for probate and record, in the county of the residence of such licentiate, and of the county in which he does business as a pharmacist." Then follow with appropriate penalty for violation.

Mr. Ebert said this suggestion should be taken into consideration by the Committee who are to draft the uniform pharmacy law, and he believed it should be adopted, and that the secretaries of the boards should be instructed to send the names of the registered pharmacists to the clerk of the court.

Prof. Oldberg then moved that the discussion of these papers be postponed

till the report on the revision of the pharmacy laws and the presentation of the model pharmacy law had been submitted.

The next paper presented was in answer to the query :

## SHALL A COMPULSORY CURRICULUM BE ESTABLISHED IN LIEU OF REGISTRATION BY DIPLOMA?

By L. E. Sayre.

The author said he interpreted the term curriculum to be a systematic course of training under competent instructors in pharmacy, materia medica, chemistry, toxicology, and such allied branches as are taught in the reputable colleges of pharmacy. The author's ideal method was that the candidate for recognition as registered pharmacist by the State Board of Pharmacy must first have a systematic course of training in a reputable school of a certain standard and must possess a diploma certifying to this fact, and then be examined.

Following the last paper was one on

## PRACTICE AND OWNERSHIP IN PHARMACY.

By Joseph Jacobs.

The author defined what constitutes the practice of pharmacy, and also defined and distinguished between to own, open, operate, manage, conduct, direct or supervise a pharmacy. In reply to the question : "Which, if any, of these provisions should be enjoyed by non-pharmacists?" he answered : none but ownership.

The next paper read was :

## CONCERNING THE QUESTIONS GIVEN IN STATE BOARD OF PHARMACY EXAMINATIONS.

By Harry B. Mason.

The author discussed the character of the oral and written questions asked by boards, and then said : "Such questions should be asked as require the use, first, of trained pharmaceutical faculties, and next, of such knowledge only as is likely to be retained in the mind by its constant application. Questions dealing with memory alone should be subjugated instead of given precedence. Then an examination would demand of a pharmacist just what practice does, and if really competent he would be able any minute to step from behind his prescription desk and pass it. He would be put to no necessity of acquiring the difficult art of preparing for an examination, and would be relieved of the injustice of going through a special 'cramming' process for months. And the quiz compend student, skilled in the art of preparing for the examination, but woefully deficient in the art of preparing for practice, would find himself wallowing beyond his depth."

The foregoing papers were received and referred to the Publication Committee and then discussed. Dr. Lyons thought it might be well to ascertain the ability of the candidate to consult books, by allowing him to refer to a library, and thereafter write a short dissertation on a given subject. Mr. Feil thought likewise. Mr. Helfman referred to a paper on the subject of examinations by Peter T. Austen, and published in the *Chemical News* about a year or so ago. Prof. Oldberg said more practical examinations should be given and less questions requiring the mere act of memorizing ; he also suggested that the examinations

be held at places, say colleges, where facilities for practical work are accessible. Prof. Whelpley thought it would be well in all cases to ascertain the qualifications of the board to examine. Mr. Ford thought one of the main troubles is that some boards have too many applicants at a time to examine them properly. Messrs. Hammel, Flexon and Parisen also spoke on the matter. It was finally suggested that a set of instructions be prepared by the Association and furnished the persons who appoint the members of the boards. The Committee on Chairman's Address reported their approval of the recommendations made therein, with the exception of the one regarding the orthography and pronunciation of the American Association for the Advancement of Science. They suggested that this one be reported on at the next yearly meeting. This action was approved and the report was adopted. The Section then adjourned. The second session of the Section convened on the same day at 2.50 P.M. Chairman Hallberg presided and read the report of the committee on a model pharmacy law. A number of propositions for a model pharmacy law were made. The chairman proposed a division or separation of the drug business into two classes, the persons conducting these classes of business to be known as pharmacists and druggists, and their places of business to be designated pharmacies and drug stores respectively. The report was received. It was moved that the report be not acted on at once, but that the Section request the Association to have 500 copies of the report printed, and that the officers of the Section be instructed to send them to all the State Boards and Associations, to all colleges of pharmacy, and to supply them to members and others desiring them for study and thought; that such recipients be asked for their opinions; also that the matter be taken up at the next meeting. The motion prevailed, and the Association, at a subsequent meeting, granted the foregoing request. The session then adjourned. In the afternoon, a steamer ride, including the upper and lower lakes, was enjoyed by the Association, and in the evening, a concert in the hotel parlors, under the direction of the Ladies' Auxiliary, was listened to by a large and appreciative audience.

Chairman Hallberg called the third session on Saturday at 10.25 A.M. The reading of the minutes of the previous session was dispensed with. A paper entitled

## A STATISTICAL REPORT OF THE USE OF THE METRIC SYSTEM IN 233,000 PRESCRIPTIONS.

By H. M. Whelpley,

was read. Reports had been received from 233 drug stores, and each dealt with the last 1,000 prescriptions on its file. These stores were located in 191 cities and towns of thirty States and Territories. Gypsum City, Kansas, led the list with 100 per cent. of prescriptions written in the metric system. The average use of the system during the past year amounted to 6·27 per cent. The report also contained the expressions of opinions of many pharmacists on the desirability and feasibility of adopting the system as the official one. The report indicated that the druggists generally are ready and prepared to fill prescriptions written in the metric system, but that the system is not, as a rule, used by physicians. Mr. Bartells said that in his experience the younger graduates in medicine used the system to a greater extent than the older practitioners. Prof. Hallberg referred to the fact that the system is the more

popular among students of pharmacy. The paper was received and referred to the Publication Committee.

The next paper was entitled

### SHALL PHARMACISTS PRESCRIBE OVER THE COUNTER?

By F. E. Stewart.

He "advocated that the druggist shall be educated in medicine and taught to prescribe intelligently over the counter in minor ailments, for which the public now consult the apothecary, not charging for his advice, but receiving his pay in the medicines he has for sale ; this he will be obliged to do if the times demand it, and this is virtually what he is doing every time he recommends a medicinal preparation of any kind to his customers."

Following this came a paper entitled

### A DISTINGUISHED PHYSICIAN-PHARMACIST—HIS GREAT DISCOVERY, ETHER-ANÆSTHESIA.

By Joseph Jacobs.

He concluded by saying : "Whatever credit may be due Jackson and Morton and Wells for their researches and their use of anæsthetics, and whatever honor may attach to the eminent surgeons of the Massachusetts General Hospital for publishing the facts at home and abroad, the real glory of the first discovery and proof of the efficacy of ether for the prevention of pain in surgery must be finally awarded to Crawford W. Long, the eminent Georgian and lamented physician-pharmacist."

The paper was received and a special vote of thanks was extended to the author. It was also moved that the Association be requested to have 500 copies of the paper printed, and that a copy, properly inscribed, be sent to each of the domestic and thereafter to foreign medical journals by the General Secretary, in order to give it wide distribution. This request was subsequently granted.

A paper entitled

### IS IT ETHICAL FOR MEDICAL MEN TO PATENT MEDICAL INVENTIONS?

By F. E. Stewart,

was then read by title.

The Committee on the Revision of Pharmacy Laws then reported. Prof. Oldberg moved that the report be referred to a sub-committee, to be appointed by the incoming Chairman of the Section, and whose duty it should be to continue the work during the coming year. It was so ordered.

The attention of the Association was then called in a note on the

### REAL RELATIONS OF THE PHARMACIST TO THE PHARMACY LAW.

By J. H. Beal,

to the fact that the required registration of poisons and keeping of qualified clerks are not legal persecutions, as many pharmacists seem to think, but are really in the first instance a legal protection, and in the second instance to the best interest of the pharmacist, because it makes the public recognize and appreciate the responsibility of his occupation. Some business remaining over from the Scientific Section was then allowed to be brought up, and Mr. Alpers, of New York City, explained in detail the system of filing and checking of prescriptions which he uses. It was regarded by many as the best system ever

proposed. Mr. Ebert, of Chicago, explained his method, which was also considered a good one. The minutes of the second and third sessions were then read and approved. Mr. Thompson suggested that in the model pharmacy law the exemption of poisons dispensed on physicians' prescriptions from the list of articles required to be registered, should be qualified to read in such a manner that the prescription is specified to be intended for a patient. Mr. Thompson also suggested that the law be constructed so as to restrict the use of narcotics, like opium and cocaine. The suggestions were referred to the Committees on the Revision of Pharmacy Laws and on a Model Pharmacy Law. Prof. Hallberg then withdrew his name as nominee for Chairman. The Secretary was then instructed to cast a ballot for Prof. Beal as Chairman. Messrs. Oldberg, Hallberg, Puckner, Whelpley, Beal, Mason, Hereth and Kaufmann withdrew their names, and Mr. Webster, of Minnesota, was declared unanimously elected for Secretary. The newly elected officers were then installed, and the retiring officers were given a vote of thanks. Adjournment was then ordered. President Morrison called the

THIRD AND FINAL GENERAL SESSION OF THE ASSOCIATION

to order at 2.55 P.M., on Saturday, August 28th. Secretary Caspari read the minutes of the second general session, and they were approved. Secretary Kennedy, of the Council, followed with the minutes of the sessions of that body. He reported that a communication had been received from H. L. Palmer and E. L. Ruddy in regard to publishing a history of the Association. Prof. Hallberg had proposed that a semi-centennial of the organization of the Association be held in 1902. A Committee on Semi-Centennial Celebration was appointed and these matters were referred to it. Mr. H. P. Hynson, of Baltimore, Md., was then elected Local Secretary for 1898. An appropriation was made for the support of the bills of the Committee on the Status of Pharmacists in the United States Army and Navy. Secretary Kennedy also reported the names of 27 new applicants for membership. The total new applicants at the meeting numbered 130, and over 100 had paid their first annual dues.

The following gentlemen were elected officers of the Council for the coming year: Chairman, W. S. Thompson, Washington, D. C.; Vice-Chairman, J. M. Good, St. Louis, Mo.; Secretary, Geo. W. Kennedy, Pottsville, Pa. The Committee on Transportation then made its report. Following this the Committee on Tax-Free Alcohol reported that Congress had attempted no legislation on the question except to impose a tax on wood alcohol, and that this measure was defeated. The committee had no recommendations to make, but it mentioned the various methods that are adopted in European countries to prepare alcohol in such a way as to render it unfit for internal use, but still retain it in a condition fit for use in the arts. It was also pointed out that tax-free alcohol would render wood alcohol quite unnecessary, as it costs about three times as much to produce wood alcohol, and besides, the latter is not so useful as ethyl alcohol. The report was referred to the Publication Committee. The Committee on National Legislation reported that the matters which had engaged its attention during the past year were the tax on alcohol, the retention of alcoholic beverages in the United States Pharmacopœia, and the question of patents and trade-marks as applied to medicines. The report was received and referred for publication. It was moved and carried to continue the Special

Committee on National Legislation, that its personnel be increased to seven, and that this be appointed by the President.

The report of the Committee on Beneficiary Features was then presented. The committee had collected information concerning such features as are carried on in foreign countries. The committee recommended that a committee be appointed to present a working plan at the next meeting, and that an appropriation of $50 be made to permit them to engage an expert insurance agent to formulate this plan. The report was received and referred to the Publication Committee. There was objection to making the appropriation, and after some discussion as to whether the committee could not devise its own plan, the motion to make the appropriation was tabled. The Committee on Meeting in 1900 reported that they had made inquiry in regard to the proposed meeting on board of a steamer *en route* to Paris, but that they had no plan to submit, for none of the steamship lines are ready to arrange for it so far in advance. They had learned that prices will not be higher than at present, that a steamship will be able to accommodate 300 persons, that the expense of going and returning will not exceed $100, and that the Hamburg-American Steamship Company's line would probably be the best to take.

The Special Committee on Weights and Measures then reported as follows:

The report presented by this committee, at the meeting held in Montreal, expressed a hope that some substantial progress might be made in the adoption of the metric system of weights and measures in this country during the year to come.

Those who have followed the proceedings of Congress for the past year will readily understand why this work has not been accomplished, or any material advancement made in it.

At the first session of the Fifty-fourth Congress, the Metric Bill was passed by a very small majority, but, upon reconsideration of the vote, the Bill was referred back to the Committee on Coinage, Weights and Measures, where it still remains.

The second and short session of the same Congress was occupied with the consideration of subjects of greater interest to the members, and it was not thought wise to bring the matter forward.

At the special session of the Fifty-fifth Congress, recently closed, the consideration of such a measure would have been impossible, consequently the past year has been one altogether unfavorable to securing any definite action upon the bill in question.

Hon. C. W. Stone, Chairman of the House Committee on Coinage, Weights and Measures, of the Fifty-fourth Congress, has been continued in the same position in the present Congress, and the Chairman of the reporting committee is informed that this gentleman will take the first available opportunity to bring the matter forward for consideration.

During the past year a number of interesting reports have been made by consuls representing the United States in foreign countries now using the metric system, as to the methods employed and inconvenience experienced in the change from their customary systems. These reports will be used as additional arguments for the adoption of the metric system in this country.

On account of the large number of changes in the membership of both the Senate and House of Representatives, caused by the elections of last year, it

will be necessary for the members of the reporting committee, and all others interested, to do active work whenever it is thought wise to bring the subject forward for consideration.

Many of the new members, as well as some of the old, will have to be convinced of the advantages to be gained by making the metric system the legal system in this country.

Although there has been very little that the committee could do during the past year, the members thereof are ready to take active interest in the matter whenever there appears to be an opportunity for securing favorable consideration of the subject.

The report was received and referred to the Publication Committee.

The report of the Committee on the Status of Pharmacists in the Army and Navy was next presented. Chairman Payne reported that there were three bills bearing on the subject in the House of Representatives, and that the outlook is far more encouraging than ever before. The report was received and referred to the Publication Committee; the reporting committee was ordered to be continued, and a vote of thanks was given it. The Chairman of Council reported that there had been no change in the investment of the funds of the Association, and that the present funds were invested in 4 per cent. trust companies' debenture bonds. Mr. Kennedy moved that the Local Secretary of next year's meeting be made Chairman of the Committee of Arrangements, with authority to appoint the other members of the committee. The motion was carried. The delegates to the National Wholesale Druggists' Association were ordered to report in writing to the General Secretary. The delegates to the American Medical Association then made their report through their Chairman, Dr. F. E. Stewart. The following subjects were referred to the Section on Materia Medica, Pharmacy and Therapeutics of the American Medical Association by the American Pharmaceutical Association at its last annual meeting, held in the city of Montreal: Liquor-selling in drug stores; dismissal of Spiritus Frumenti and Spiritus Vini Gallici from the United States Pharmacopœia; dismissal of Vinum Rubrum and Vinum Album from the United States Pharmacopœia; dismissal of all tinctures having a fluid extract of the same drug official, and all fluid extracts having a tincture of the same drug official, and substitute for such tinctures and fluid extracts 50 per cent. tinctures under a distinctive title; and the return to potassium sulphate as a diluent in making Dover Powder, in place of sugar of milk, used since 1880. The Section concurred in the dropping of liquors from the Pharmacopœia, and in the restoration of potassium sulphate, but did not agree to the other changes.

The report was received, accepted and referred to the Publication Committee. The Committee on Time and Place of Next Meeting reported that the Association would convene on the last Monday of August, 1898, in Baltimore, Md. Secretary Caspari then read a communication from the South Carolina Pharmaceutical Association, in the form of a telegram, expressing the best wishes of that Association. He also read invitations from Galveston, Tex., and Buffalo, N. Y., for the Association to hold its meetings in these respective places. The Secretary was authorized to reply to all of these courtesies. An acknowledgment by Prof. J. U. Lloyd, on behalf of the Lloyd Library, of the receipt of the various books from the libraries of the Association, and from some of its members, was read, received and referred to the Publication Committee. Mr. Alpers then presented the following resolution:

*Resolved*, That in accordance with the recommendation of the Chairman of the Scientific Section, a committee of five be appointed during the coming year by the President-elect of the Association, for the purpose of taking action to give pharmacy its due recognition and representation in the proposed National Department of Health; and that the President of the Association and the Chairman of the Section on Legislation be members of this committee *ex officio*. It was adopted. Mr. Sheppard moved that Local Secretary Shumpik be empowered to call meetings and act as presiding officer during the social week following the regular business of the Association. Secretary Kennedy then invited the applicants for membership whose names had been posted during the session to complete their membership and become active members of the Association. A preamble and accompanying resolutions which had been drafted by the American Medical Association were then presented to the session by the delegates to the American Medical Association. This document had been considered by the Council of the American Pharmaceutical Association, but not being disposed to act on it, that body had referred it to the Association proper for discussion. The preamble explained that the intention of the resolutions was the formation of a code of ethics which should govern physicians and pharmacists alike in the matters considered in the resolutions. These resolutions dealt with the subjects of the relation of physicians and pharmacists to each other and to the public at large; the prevention of secrecy and monopoly in the manufacture and use of medicines; the granting of patents on medicines, machinery and methods of preparation; a commission of medical men to regulate the publication of certain trade secrets; the sanctioning of the specification by physicians on prescription of the products of those pharmacists who conform to the code of ethics; the teaching of sufficient pharmacy in colleges of medicine to enable the graduates thereof to distinguish between legitimate pharmacy and pharmaco-quackery; and the use of the United States Pharmacopœia as a text book in both colleges of medicine and pharmacy. After discussing the resolutions, certain of them were amended and then adopted; others were stricken out as impracticable or antagonistic to certain efforts of the Association, while still others were adopted as presented. The adopted resolutions were then referred to the American Medical Association, and Dr. Stewart, the chairman, was given a special vote of thanks. It was moved and adopted that a delegation of five members be appointed by the President to visit the National Wholesale Druggists' Association, and carry the fraternal greetings of the American Pharmaceutical Association. On motion of Mr. Thompson, a resolution of appreciation was offered to the Local Committee of Arrangements, the Ladies' Auxiliary Committee, and all others who had taken part in providing the hospitable entertainment which the Association had received during the meeting. Mr. Frost replied to the resolution in some well-chosen words. A recess of five minutes was then granted by the Chair. The first business, when the session was thereafter called to order, was the installation of the officers-elect. President Whitney now occupied the chair, and Mr. Main moved that a vote of thanks be tendered the retiring officers for the able manner in which they had carried out their duties. This action was heartily approved by the session. The meeting then adjourned, subject to the call of the Chair, on September 6, 1897.

// THE AMERICAN
JOURNAL OF PHARMACY

*OCTOBER, 1897.*

# THE TANNIN OF CERIOPS CANDOLLEANA.

BY HENRY TRIMBLE.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 170.

Having received two samples of the bark from this member of the mangrove group, which had been collected in widely separated localities in India, it was thought that an investigation of the principal constituent, tannin, might prove of interest.

One sample was received from A. E. Wild, Conservator of Forests, Bengal; it was collected in that locality in February. The other sample was sent from Singapore, and was collected there in November; it was forwarded to me by H. N. Ridley, of the Botanic Gardens at that place.[1]

Ceriops Candolleana, like many other members of the Rhizoporaceæ, is found in nearly all the low muddy shores of India, and the Andaman Islands. It is known under the vernacular names of Kirrari, Gorán, Madá and Tengah, according to the locality in which it grows. It is a small, evergreen tree, with dark red bark and hard red wood. The pores of the wood are very small, and the medullary rays very fine, slightly wavy and equidistant. Pores joined by fine, wavy, interrupted, concentric bands.

The bark is of a deep reddish-brown color, and is covered on the outer surface with numerous conspicuous lenticels. It yields a

[1] To both Mr. Wild and Mr. Ridley the author is under obligations for other valuable samples.

deep port wine coloring to water, and contains large quantities of both coloring matter and tannin. On these two substances depends the use of the bark for both dyeing and tanning. It is by far the most valuable one of the mangrove barks for tanning. The claim is made[2] that it imparts a fine red color to leather. It may be said, in regard to this, however, that tanners usually object to a reddish color imparted by tanning materials, and the objection heretofore to all mangrove barks has been the tendency they have to produce a red color and a soft leather. Another real objection to the mangrove extract sent from a tropical climate has been noted by Mr. Ridley, who says the stuff has generally been so abominably prepared that no one will look at it. At the present time attempts are being made to manufacture a good quality of extract in southern India and Borneo for export.[3]

The wood is used in the province of Sind for the knees of boats and several other purposes, and in Lower Bengal for house posts and for firewood.

Each of the two samples yielded the following percentages of moisture, ash and tannin :

| | Moisture. | Ash in absolutely dry sample. | Tannin in original sample. | Tannin in absolutely dry sample. |
|---|---|---|---|---|
| Sample from Bengal . . . | 13·70 | 5·83 | 27·24 | 31·56 |
| Sample from Singapore . . | 13·34 | 10·60 | 20·00 | 23·07 |

It will be seen from the tannin percentages that Ceriops well deserves the reputation it has for being the most valuable one of the mangroves. The per cent. of tannin is more than is usually found in barks, and is perhaps only equalled by the wattle barks of Australia. The differences of both tannin and ash in the above samples are considerable, but not more than is found in our oaks when collected at different seasons of the year.

A quantity of tannin was prepared from the Bengal sample. It was thoroughly purified and submitted to elementary analysis, yielding the following percentage results :

| | |
|---|---|
| Carbon . . . . . . . . . . . . . . . . . . . . . . . . | 61·13 |
| Hydrogen . . . . . . . . . . . . . . . . . . . . . . . | 5·29 |

These figures, with the reactions towards iron salts, bromine water and calcium hydrate, prove it to belong in the class of oak bark tannins.

[2] Watt, *Dictionary of the Economic Products of India*, Vol. II, p. 261.

[3] *Kew Bulletin* for February and March, 1897, contains a report by Professor Hummel on the value of Ceriops bark for dyeing purposes.

# THE CAMPHOR TREE.[1]

## (*Cinnamomum camphora*, Nees & Eberm.)

By Lyster H. Dewey.

### DESCRIPTION.

The camphor tree is a broad-leaved evergreen, related to the red bay and to the sassafras of the United States. In its native habitat it attains a height of 60 to 100 feet, with wide-spreading branches and a trunk 20 to 40 inches in diameter. Its general habit is similar to that of the basswood. The leaves are broadly lanceolate in


*Fig. 1.*—Camphor tree: *a*, young, leafy shoot, scale one-third; *b*, flower cluster, life size; *c*, fruit, life size.

form, with acuminate points at both base and apex, of a light green color, smooth and shining above and whitish, or glaucous, on the under surface. The lower pair of lateral veins are more prominent than the others, but the leaves are not as distinctly three-nerved as

[1] United States Department of Agriculture, Division of Botany. Circular No. 12.

those of the cinnamon and many other species of the genus. The small white or greenish-white flowers (*Fig. 1, b*) are borne in axillary racemes from February to April, on shoots of the previous season, and are followed in October by berry-like, one-seeded fruits about ⅜ inch in diameter (*Fig. 1, c*). The fruiting pedicels terminate in a saucer-shaped disk, persisting after the mature fruit has fallen.

### NATIVE RANGE.

The camphor tree is native in the coast countries of Eastern Asia from Cochin China nearly to the mouth of the Yang-tse-kiang, and on the adjacent islands from the southern part of the Japanese Empire, including Formosa and the Ryukyu Islands, to Hainan, off the coast of Cochin China. Its range also extends into the interior of China as far as the province of Hupeh, about 500 miles from the coast on the Yang-tse-kiang, in latitude 30° north. This area, extending from 10° to 34° north latitude, and from 105° to 130° east longitude, is all embraced in the eastern monsoon region, which is remarkable for abundant rains in summer.

The camphor trees growing wild in the native range are usually most abundant on hillsides and in mountain valleys, where there is good atmospheric as well as soil drainage. The temperature in the greater part of this region, which is partly within the tropics and partly subtropical, rarely falls below freezing. The tree is an evergreen, changing its leaves generally in April, and therefore the winter temperature is a factor of more importance than would be the case with a deciduous tree.

### RANGE UNDER CULTIVATION.

Notwithstanding the comparatively narrow limits of its natural environment, the camphor tree grows well in cultivation under widely different conditions. It has become abundantly naturalized in Madagascar. It flourishes at Buenos Ayres. It thrives in Egypt, in the Canary Islands, in southeastern France, and in the San Joaquin Valley, in California, where the summers are hot and dry. Large trees, at least 200 years old, are growing in the temple courts at Tokyo, where they are subject to a winter of seventy to eighty nights of frost, with an occasional minimum temperature as low as 12° to 16° F. The most northern localities in the United States, so far as known at this Department, where the camphor tree has

been grown successfully out of doors, are Charleston and Summerville, in South Carolina, Augusta, Ga., and Oakland, Cal.

At Charleston, Summerville and Augusta the trees have withstood a minimum temperature of 15° F., but they have been protected by surrounding trees and buildings. At Mobile, Ala., the trees have grown and fruited in protected situations, while in exposed places they have been repeatedly destroyed by frosts. While the camphor tree will grow on almost any soil that is not too wet, it does best on a well-drained sandy or loamy soil, and it responds remarkably well to the application of fertilizers. Its growth is comparatively slow on sterile soils, but under favorable conditions it

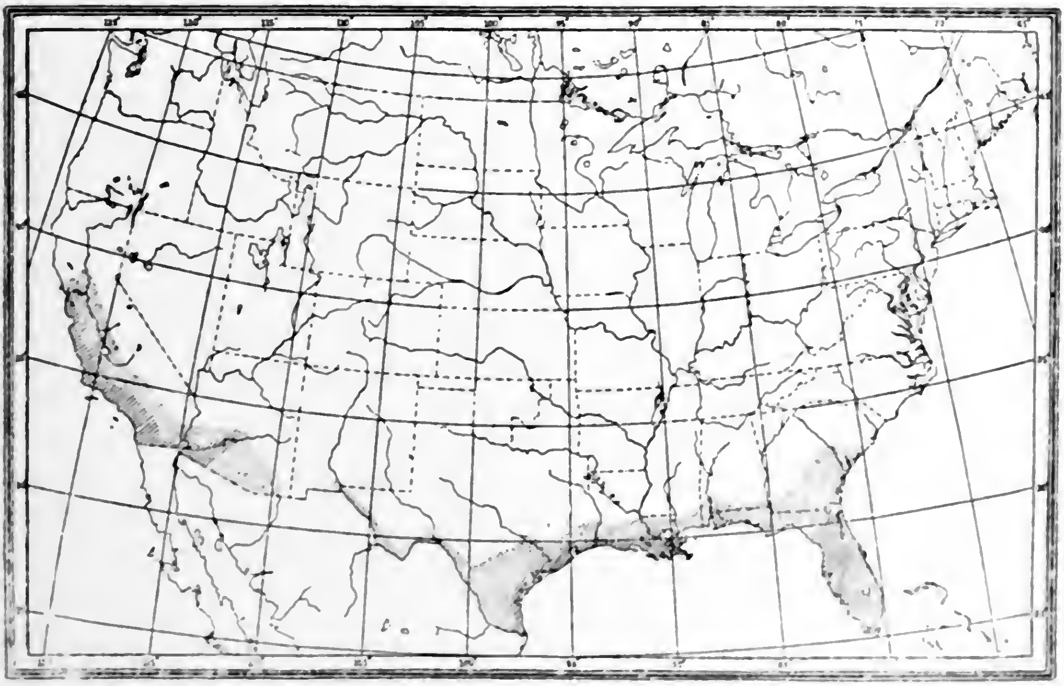

*Fig. 2.*—Map showing approximate areas where the camphor tree may be grown in the United States. In the dotted area protection from cold will be required. In the line-shaded area protection will not often be required, except in exposed situations and on the mountains of California.

sometimes grows very rapidly. An instance is recorded of a camphor tree in Italy a foot in diameter and 90 feet high, eight years from the seed. Under ordinary conditions, however, such a girth is not often attained in less than twenty-five years, and such a height is rarely attained in a century. Under favorable conditions an average of 30 feet in height, with trunks 6 to 8 inches in diameter at the base, may be expected in trees ten years from the seed.

## USES OF THE TREE AND ITS PRODUCTS.

The principal commercial uses of the camphor tree are for the production of camphor gum and camphor oil. Camphor gum is employed extensively in medicine. It enters into the composition of many kinds of liniments for external application. For liniment it is used especially in combination with olive oil. It is taken internally for hysteria, nervousness, nervous headaches, diarrhœa and diseases affecting the alimentary canal. It is a specific in cases of typhoid fever and cholera. Camphor fumes have been used with success in cases of asthma. It has been used very extensively to keep insects out of furs, woollens, etc. In Japan camphor and camphor oil are used in lacquer work. The oil is somewhat similar to turpentine, and could doubtless be used to advantage in varnishes and shellacs. It is now used in the manufacture of toilet soaps. In Japan and China it has been used for illuminating purposes, but it produces a smoky flame.

Among the secondary uses of the camphor tree the most important is for ornamental planting. Its bright evergreen leaves, rapid growth and long life make it valuable for this purpose. In Japan and China it has been the principal tree planted in the temple courts for many centuries, and in those countries it takes the place of the historic oaks of England. It has been extensively introduced into Southern Europe and South America for ornamental purposes.

The wood, with its close grain, yellow color, and susceptibility to polish, taking a kind of satin-like finish, is exceedingly valuable in cabinetwork, especially for making drawers, chests and cupboards proof against insects. The leaves and young branches, although they have but a slight odor of camphor, are packed with clothing or scattered about unused rooms to guard against insects.

The tree produces an abundance of berry-like fruits, which are used in Japan and China to make a kind of tallow. The fruits are greedily eaten by chickens and birds, especially mocking birds, which often select camphor trees for nesting places.

## CONDITIONS OF SUCCESSFUL CULTIVATION.

For most of the secondary purposes, the camphor tree may well be cultivated wherever it can be made to live; but for the distillation of gum and oil with a commercial view, and for the production of wood for cabinet purposes, it must be grown under the most

favorable conditions. The minimum winter temperature should not be below 20° F., and this minimum should be of rare occurrence. The soil, preferably sandy and well drained, should be irrigated unless there are abundant rains. Fifty inches of water during the warm growing season is desirable, and much more may well be used where the air is very dry.

An abundance of plant food, rich in nitrogen, is required for rapid growth; but the kind of fertilizer that can be most profitably applied will vary according to the character of the soil in each locality. In the absence of definite information in this regard, the kind of fertilizer producing most rapid growth of wood in the orange or in other fruit trees may be taken as an index.

The northern boundary of the dotted area on the accompanying map (*Fig. 2*) marks, approximately, the limit within which the camphor tree may be grown in situations protected by buildings or by other trees, while the northern limit of the area shaded by lines marks the approximate boundary of the area within which it may be grown without protection. Further experiments in planting the camphor tree will doubtless modify both of these lines somewhat. It is hoped that by continued selection of seeds from the most hardy trees plants may be bred up to endure more cold.

### PROPAGATION.

Camphor trees may be grown either from seed or from cuttings. They are usually grown from seed, as the trees fruit abundantly, and seedlings can be grown more easily than cuttings. The seeds are collected at maturity in October and November, and, after drying, are packed in sharp white sand or some similar material to keep them fresh until the time of planting in spring. About the last of March they are sown in drills in the seed bed.

The soil of the seed bed should be a good sandy loam mixed with about one-third leaf mould. The seed bed should be kept moist, but not too wet, and should be shaded from the direct rays of the sun if the weather is warm. The best soil temperature for germinating camphor seeds is from 70° to 75° F. The temperature of the atmosphere may be 10 degrees higher. The seedlings will grow well at higher temperatures, but are likely to lack vigor and hardiness.

The seedlings may be grown in pots, which will facilitate trans-

planting at any time, or they may be transplanted in nursery rows early in April when one year old. Plants two years old are generally regarded as best for final planting. At this age they vary from 20 to 40 inches in height.

### PLANTING AND CULTIVATION.

When set out for ornamental purposes, the camphor tree may be expected to grow, in favorable situations, about as rapidly as a Le Conte pear, and to require about as much room. In Japan, where the law requires that a new tree shall be set out for every one cut, they are not generally set in straight orchard rows, but cultivation there is performed almost exclusively by hand labor. There are no records showing results of regular orchard planting, hence the distances at which trees should be planted must be determined by the size and form of the trees and the methods of cultivation, and of procuring the gum. They may be set closely in rows about 10 feet apart, and alternate rows cut and reset every five years, thus producing bush-like plants of ten years' growth. They may be planted in checks 10 feet square, and alternate trees cut every ten or twelve years, or they may be planted in larger checks, and all of the trees be cut at the age of fifteen or twenty years.

There are not sufficient data obtainable upon which to base definite statements as to the best methods of planting or the age at which the trees may be cut with greatest profit for the production of gum. A recent English consular report from Japan states that "although hitherto the youngest wood from which camphor was extracted was about seventy to eighty years old, it is expected that under the present scientific management the trees will give equally good results after twenty-five or thirty years." Camphor of good quality has been produced in Florida from the leaves and twigs of trees less than twenty years old, 1 pound of crude gum being obtained from seventy-seven pounds of leaves and twigs.

The trees will endure severe pruning with little apparent injury. One-third of the leaves and young shoots may be removed at one time without materially checking the growth of the tree. The largest proportion of camphor is contained in the older, larger roots; the trunk, limbs, twigs and leaves containing successively a decreasing proportion. When the camphor tree is killed nearly to the ground by frost it sends up vigorous shoots from the base. It may

be expected to do the same when cut, especially if cut late in the fall. Experiments are needed to determine whether this growth may be depended upon, or whether it will be more profitable to dig out the larger roots and set out new seedlings.

### DISTILLATION OF CAMPHOR IN JAPAN.

In the native forests in Formosa, Fukien and Japan camphor is distilled almost exclusively from the wood of the trunks, roots and larger branches. The work is performed by hand labor, and the methods employed seem rather crude. Different methods of distillation are employed in different districts, but those in use in the province of Tosa, in Japan, appear to be the most skilful. The camphor trees are felled, and the trunk, larger limbs, and sometimes the roots, are cut into chips by hand labor with a sharp concave adz.

The fresh chips are placed in a wooden tub about 40 inches high and 20 inches in diameter at the base, tapering toward the top like an old-fashioned churn. The perforated bottom of the tub fits tightly over an iron pan of water on a furnace of masonry. The tub has a tight-fitting cover, which may be removed to put in the chips. It is surrounded by a layer of earth about 6 inches thick to aid in retaining a uniform temperature. A bamboo tube extends from near the top of the tub into the condenser. This consists of two wooden tubs of different sizes, the larger one right side up, kept about two-thirds full of water from a continuous stream which runs out of a hole in one side. The smaller one is inverted with its edges below the water, forming an air-tight chamber. This air chamber is kept cool by the water falling on the top and running down over the sides. The upper part of the air chamber is sometimes filled with clean rice straw, on which the camphor crystallizes, while the oil drips down and collects on the surface of the water. In some cases the camphor gum and oil are allowed to collect together on the surface of the water, and are afterward separated by filtration through rice straw or by pressure.

About twelve hours are required for distilling a tubful by this method. Then the chips are removed and dried for use in the furnace, and a new charge is put in. At the same time the camphor and oil are removed from the condenser. By this method 20 to 40 pounds of chips are required for 1 pound of crude camphor gum.

The principles generally held to be essential in distilling camphor of good quality are: (1) The heat must be uniform and not too great, producing a steady supply of steam; (2) the steam, after liberating the camphor, must not come in contact with metal, that is, the tub and condensing apparatus must be of wood.

### SUGGESTED IMPROVEMENTS.

Many improvements upon the methods described can doubtless be made, tending both to a reduction in cost and an increase in the proportion of crude gum obtained. Instead of an adz wielded by hand labor a machine similar to the "hog" used for grinding up waste slabs in saw-mills may be used to reduce camphor limbs to the requisite fineness for distillation. Better distilling apparatus can probably be devised. Thermometers may be introduced to determine the heat in the distilling tub, and the furnace may be so arranged as to permit better control and greater economy in fuel. Camphor and camphor oil are both slightly soluble in water, and the condensing chamber should be improved so as to recover the product that is being constantly carried off in the running stream which cools the chamber.

### OUTLOOK FOR FUTURE MARKET.

The consumption of camphor in this country, as measured by the importations, has been decreasing during the past ten years, while the price has been increasing, as indicated by the following table:

IMPORTS, VALUES AND APPROXIMATE VALUES PER POUND OF CAMPHOR FOR YEARS ENDED JUNE 30, 1887–1896, AND FOR NINE MONTHS ENDED MARCH 31, 1897.

| | Crude Camphor—Duty Free. | | | Refined Camphor—Dutiable. | | | |
|---|---|---|---|---|---|---|---|
| Years. | Quantities. | Values. | Value per pound. | Quantities. | Values. | Value per pound. | Rates of Duty. |
| | *Pounds.* | | | *Pounds.* | | | *Per lb.* |
| 1887 | 2,873,184 | $352,861.00 | $0.12 | 307 | $45.00 | $0.15 | 5 cents. |
| 1888 | 2,779,719 | 304,460.00 | .11 | 61 | 7.77 | .13 | do |
| 1889 | 1,974,500 | 293,031.44 | .15 | 72 | 10.50 | .15 | do |
| 1890 | 2,061,370 | 421,385.00 | .20 | 87 | 37.75 | .43 | do |
| 1891 | 1,666,074 | 468,025.00 | .28 | 63 | 21.23 | .33 | 4 cents. |
| 1892 | 1,955,787 | 447,634.00 | .23 | 56,820 | 17,361.00 | .31 | do |
| 1893 | 1,723,425 | 446,548.00 | .26 | 156,291 | 51,229.33 | .33 | do |
| 1894 | 1,323,932 | 309,407.00 | .23 | 137,882 | 44,233.00 | .32 | do |
| 1895 | 1,509,713 | 284,958.00 | .19 | 271,164 | 83,382.00 | .31 | (*) |
| 1896 | 943,205 | 328,457.00 | .35 | 153,912 | 68,785.00 | .45 | (*) |
| For 9 months, March 31, 1897 (latest reports obtainable) | 855,284 | 207,137.77 | .24 | 155,027 | 52,811.00 | .34 | (*) |

* Ten per cent. ad valorem.

The Tariff Act approved July 27, 1897, imposes a duty of 6 cents per pound on refined camphor and leaves crude camphor on the free list, as heretofore.

There has been an increase in importations of refined camphor, due to improved methods of refining and packing in Japan and to changes in the tariff; but this increase has been much more than counter-balanced by the decrease in importations of crude camphor.

The decrease may be attributed to the following causes: (1) The exhaustion of the supply of the available camphor trees near the shipping ports; (2) the governmental restrictions on the trade in camphor in Formosa: (3) government taxes on the exportation of camphor from Formosa; (4) hostilities and wanton destruction of camphor stills by the natives in Formosa; (5) disturbances in the camphor-producing district of China; (6) the China-Japan war; (7) attempts by speculators to corner the market.

These causes have increased the price of camphor, and this in turn has led to the introduction of substitutes. Menthol and other peppermint derivatives or compounds, carbolic acid and its derivatives, naphthalin, formalin and insect powder are now used for various purposes where camphor was formerly employed. Camphor has been manufactured artificially at a cost leaving a margin of profit at present prices. It is, therefore, apparent that if the production of camphor from the trees is to be carried on with profit in this country, and the industry increased to any considerable extent, the price of camphor must be reduced to compete with the prices of substitutes now taking its place.

Camphor has been obtained from several other plants not at all related to the ordinary camphor tree; but only two kinds, Borneo camphor and Blumea camphor, are of any importance commercially.

Borneo camphor is obtained from the camphor tree of Borneo and Sumatra, *Dryobalanops aromatica.* It is deposited in clefts and hollows in the wood, and has simply to be taken out. This camphor is comparatively rare and the supply is consumed almost exclusively in China, where it is valued at from thirty to ninety times as much as ordinary camphor.

Blumea camphor is obtained by distillation from *Blumea balsamifera*, a shrub growing in Burmah and the Malay Peninsula. This is usually refined in Canton, whence about 10,000 pounds are ex-

ported annually. The source of this supply is abundant, and as the industry develops it is likely to enter more into competition with ordinary camphor. Neither of these plants can be grown in the United States, except possibly in southern Florida, without protection against cold.

Approved:

JAMES WILSON,

*Secretary of Agriculture.*

WASHINGTON, D. C., August 12, 1897.

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# ON THE THERAPEUTIC PROPERTIES OF ALCOHOL AND THE REASONS WHY THE FERMENTED AND DISTILLED LIQUORS USED AS BEVERAGES SHOULD NOT BE RECOGNIZED IN THE PHARMACOPŒIA AS MEDICINAL AGENTS.[1]

BY N. S. DAVIS, A.M., M.D., LL.D.

Pure ethyl alcohol, undiluted, is regarded by all chemists and intelligent physicians as an active poison, rapidly destructive of both vegetable and animal life whenever brought into contact with either. The presence of absolute alcohol in contact with any living tissue immediately arrests all natural metabolic and vital processes in such tissue, and causes it to become corrugated or shrunken and dead. Swallowing absolute alcohol, undiluted, as quickly destroys the vitality of the membranes of the mouth, throat and stomach, and kills the individual, as does pure carbolic acid. Consequently, alcohol, in its pure and undiluted state, is not capable of being used as a medicine, but when largely diluted with water, as it is in all the fermented and distilled beverages, its direct corrosive or corrugating effect upon the membranes it comes in contact with is so much diminished that it is capable of being absorbed and conveyed in the blood to all parts of living body. In this diluted condition, therefore, it early began to be used both as a medicine and as a popular drink; and as the most readily appreciable effect was to diminish the

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[1] Presented to the Section on Materia Medica, Pharmacy and Therapeutics at the Forty-eighth Annual Meeting of the American Medical Association, held at Philadelphia, June 1-4, 1897, and taken from the *Journal of the American Medical Association*, of August 21, 1897.

individual's consciousness of impressions, not only from without, but also from within, it soon came to be regarded as a universal tonic and restorative. Its supposed tonic and restorative effects were based wholly on the sensations and movements of patients or individuals under the influence of moderate doses, for it was soon demonstrated that large doses directly diminished strength, sensibility and action. But when, under the influence of moderate doses, the patient said he felt less weak or weary, felt the sensation of cold or heat as painless, felt lighter or more buoyant, and his heart was found to beat faster, it was perfectly natural for both physician and patient to think the alcohol was acting as a tonic or stimulant and general restorative. It was not until the advancement in analytic chemistry and the physiology of all parts of the nerve structures of man, coupled with the researches in physics and biology of the last half century, that we have had it in our power to prove the incorrectness of these conclusions founded on the sensations and actions of the patient under its influence. The more recent chemico-physiologic researches have shown more clearly the composition of the blood and the various tissues of the body, and especially the existence and functions of the hæmoglobin, leucocytes and other corpuscular elements of both blood and tissues, and the part each plays in the reception and internal distribution of oxygen, with its effects on all the metabolic changes in living bodies. By the same class of researches it is shown that alcohol, diluted with water and taken into the stomach, is rapidly absorbed by the capillaries and is conveyed in the blood to every tissue in the body, and by its presence retards the natural metabolic changes, lessens the processes of oxidation and elimination, diminishes nerve sensibility and, when repeated from day to day, induces cell and tissue degeneration. By the more recent studies in the anatomy and physiology of the several parts of the nervous system, it has been shown not only that the action of the heart and the movement of the blood in the vessels are directly under the control of the cardiac and vasomotor nerves, some of the fibres of which are exciters of action, while others are inhibitors, by which uniformity and harmony is maintained in the circulation of the blood, but also that our voluntary movements and sensations are manifested by the cerebro-spinal nerves, having their exciters and inhibitors by which we are enabled to co-ordinate muscular contractions and relaxations in executing all complex movements, and

equally so it is that our mental actions, manifested through the convolutions of the brain, are regulated by exciters and inhibitors. Every individual whose brain is in its normal condition has frequent sensations, impulses or exciters of mental actions which he promptly inhibits or disregards. Indeed, it is on the proper development of this mental inhibition that every person's self-control and sense of propriety depends.

If it is true, as has been already stated, that alcohol, when taken into the living system in large doses, is an active poison, quickly destroying animal life, and in smaller doses is an anæsthetic, directly diminishing cerebral sensibility and mental consciousness and retarding all metabolic changes, both in the blood and tissues, it follows as a logical and necessary inference that, if administered as medicine, it should be done with the same care and exactness in regard to purity, dose and time that we exercise in prescribing morphine, quinine, aconite, arsenic or any other active drug. This cannot be done by using any of the various fermented and distilled liquors ordered either from drug stores or liquor dealers, since they are kept at no uniform standard of either strength or purity. The present Pharmacopœia recognizes as medicines, vinum or wine, spiritus frumenti or whiskey, and spiritus vini gallici or brandy, but does not give a definite official standard of alcoholic strength for either of them. Neither does it give any reliable and readily available tests by which the strength and purity of the articles can be determined by the ordinary practitioner of medicine. Repeated analyses have shown that the amount of alcohol in different samples of wine varies from 6 to 25 per cent.; in whiskey, from 35 to 50 per cent., and in brandy, from 40 to 60 per cent. Such variations in the strength of any other medicine would quickly cause its standard to be corrected, or its exclusion from the official list of drugs. As alcohol is the only important therapeutic agent in all these liquors, why not let pure alcohol of fixed strength be officially recognized to the exclusion of all the varieties of both fermented and distilled drinks? Then every practitioner desiring to give alcohol as a remedy could order it with any desired degree of dilution with water, and he would know what his patient was getting and how much, and the pharmacist would no longer need to pay for a license to sell liquors, or to be classed with the ordinary dealers in such beverages. One of the most important improvements in modern pharmacology consists in the separation of

the active therapeutic agents from the more complex or crude drugs, and thereby enables the physician to administer them with far greater convenience and certainty. Very few intelligent physicians of the present day would think of prescribing crude opium when they desired to produce only the anodyne effects of the morphine it contained, certainly not without knowing what per cent. of morphine would be in the crude drug. Why, then, should he prescribe the uncertain mixtures called beer, wine, whiskey or brandy, when his sole object is to obtain the therapeutic effects of alcohol? If it is claimed that these several fermented and distilled liquors contain other therapeutic agents in addition to the alcohol, we answer that, so far as any such agents exist, their proportionate quantity and quality are far more variable and uncertain than is their per cent. of alcohol. Almost the only constituents found in whiskey and brandy, besides the alcohol and water, are very variable quantities of fusel oil, tannin and, in very old specimens, a trace of some ethereal substance to which connoisseurs attribute the special *bouquet*. So far from adding to the therapeutic value, the first two substances are regarded as very undesirable impurities, and the last named has never been isolated in sufficient quantity to have its medical qualities tried. Much has been said and written concerning valuable nutritive constituents in the different varieties of wine, but the numerous analyses on record show only very variable quantities of fecula, saccharine matter, tannin, some vegetable acids and potassium salts, in addition to the alcohol and water. Of these extra ingredients the fecula and saccharine matter are the only ones that could be classed as nutritive or capable of being converted into any natural element of the blood or tissues of the body.

The quantity of these in any variety of wine is so limited that it would require several barrels of the wine to furnish the equivalent of a pound of bread. Consequently, it would be far more economic, as well as more scientifically accurate, for every physician to prescribe such doses of pure alcohol and water to be given with such quantity of sugar, milk or meat broth, as he thought his patient might need. The physician who cannot do this, and thereby accurately adjust the proportion of all the elements his patient may need, has certainly received a very defective professional education. It would be a long and very important step in advance, both in the interests of scientific accuracy and of humanity, if all physicians,

when they thought alcohol was needed, would prescribe it in the manner just indicated, and if in the next revision of the Pharmacopœia, only alcohol of standard strength was retained to the exclusion of all fermented and distilled liquors. If these changes were adopted and carried into general practice, the result would be a more complete separation of both pharmacist and physician from connection with, or responsibility for, the general traffic in and uses of the various alcoholic liquors in popular use.

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## STROPHANTHUS NICHOLSONI—A NEW SPECIES.[1]

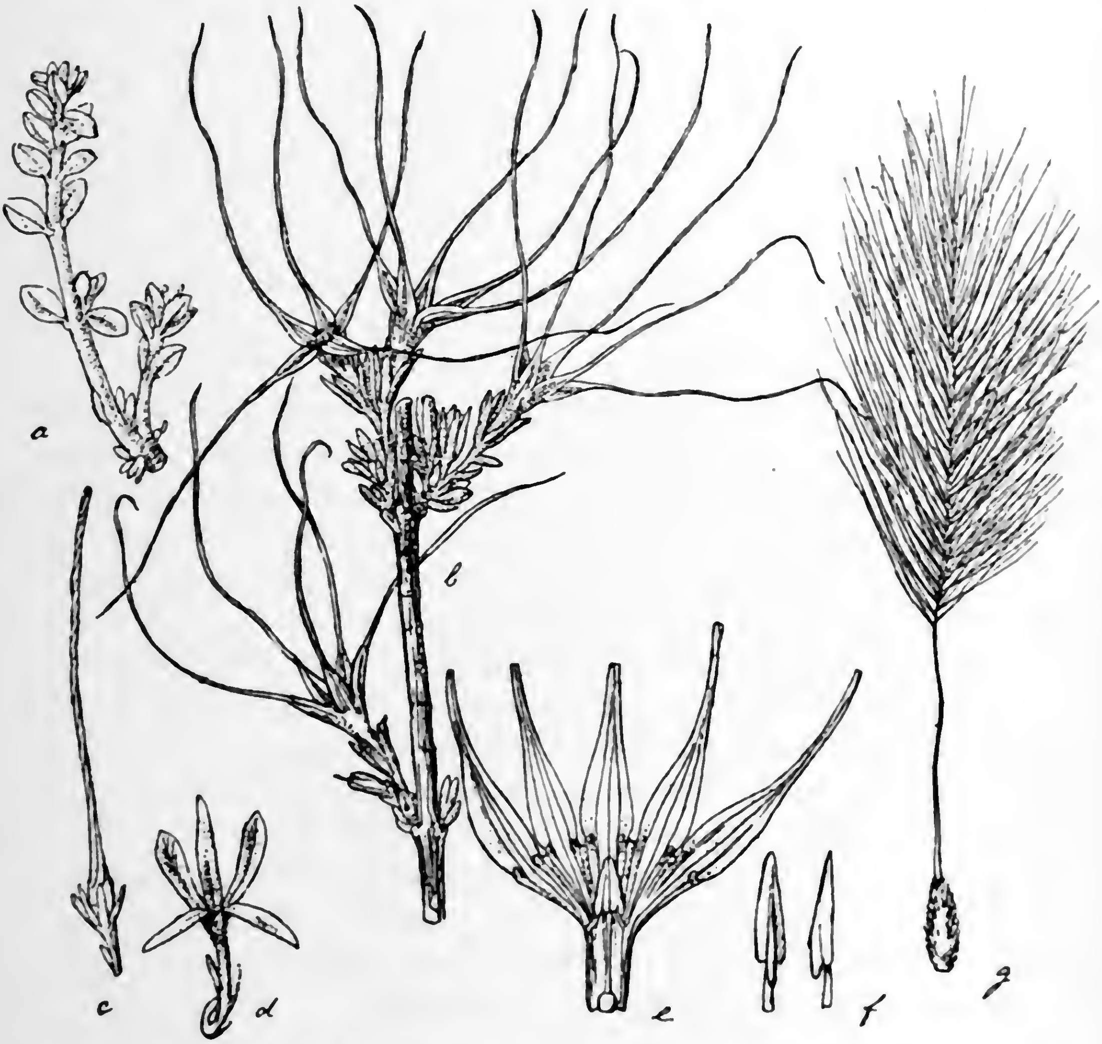
By E. M. Holmes.

For some years past I have been endeavoring to obtain herbarium specimens in flower and fruit of the species yielding the kombe seed of commerce, and the "white woolly" strophanthus seeds imported from the same district, but hitherto without success. Dr. T. G. Nicholson, who has lately returned from Central Africa, kindly promised to endeavor to obtain specimens, and has brought back flowers and fruit of a strophanthus, the seeds of which appear to be identical with those of the "white woolly" strophanthus. The plant proves to be a new species hitherto undescribed. Dr. Nicholson has given me the following description of the plant: It is a small bush or shrub, about 3 or 4 feet high, having the habit of growth of the flowering currant (Ribes sanguineum, Pursh.), but the main branches curve slightly outwards, and the slender twigs are patent at an obtuse angle.

It grows in alluvial plains at the base of granite hills, intersected by quartz veins. These plains are at an altitude of about 2,200 feet above sea-level. The ground is sodden from the middle of November until the beginning of April. It is sparsely covered with bush, and there is very little shade where the strophanthus grows. The temperature averages about 105° F. in the sun and 50° F. in the night. The specimens in flower were gathered at the end of October. There are the pods of the previous year opening on the bush at the same time that the flowers are in blossom, and in December the flowers are over and the seeds scattered. At the time the plant flowers there are no leaves formed, or they are only very slightly developed.

[1] *Pharmaceutical Journal*, September 4, 1897.

The general color of the flowers is of a pink hue, with a tinge of dusky fawn. The throat of the corolla is yellow, with dark purple lines and spots. The thread-like corolla segments or "streamers" are of a pinkish purple. The whole corolla in withering fades to yellow, but does not readily fall off. The fruit is of a purplish plum




Strophanthus Nicholsoni, n. sp.—*a*, leafy twig with leaves undeveloped; *b*, leafless inflorescence; *c*, unopened flower; *d*, calyx; *e*, corolla, with tails removed; *f*, anthers; *g*, seed; *a*, *b*, *c*, *g*, about two-thirds natural size; *d*, *e*, *f*, enlarged.

color, and marked with linear oval lenticels, some of which are nearly 1 centimeter long. The district in which he found the plant extends from Lusengasia, in the Senega country, in a southwest direction to the Loangwa River.

The Ozimba natives would not admit that they used it as an

arrow poison, but stated that it was so used by the Chipéta people. The plant is most nearly allied to S. schuchardti, Pax., and may be characterized by the following description:

*Strophanthus Nicholsoni, n. sp.*—Frutex dumosus, ramis griseofuscis, vetustis glabris, novellis dense tomentosio; folia (juniora solum visa, ad 1 centimeter longa), brevissime petrolata, crassa, ovata, basi cordata, obtusa, utraque facie velutina, grisea, nervis in conspicuis; cymæ secus ramos denudatos, ramulum abbreviatum terminantes, abortu 1–3 floræ, pedunculo calycem subæquante, bracteis *auguste linearibus;* calycis segmenta erecta, linearia, *inequalia*, acuta duo latiora, diametro millimetrum æquantes, corollæ tubo paulo breviora; corolla *tota pubescens*, fauce interno tenuissime pubescente, tubo inferne cylindrico, fauce dilatato, lobis lanceolatis ad 15 millimeters, in caudam elongatam 6–10 centimeters, productis; faucis *squamæ tenuissime pubescentes*, parvæ, ad 2 millimeters longæ, lanceolatæ, obtusæ, antheræ sagittatæ filamentis glabris; ovarium hirsutum; fructus purpureus lenticellosus, 14–27 centimeters longus; semina 1½ centimeters longa 5 millimeters lata, dense velutina, pallide bruneo alba, aristæ parte nuda 4½ centimeters, comosa 6 centimeters longa.

The main branches are about 1½ centimeters thick, with slightly swollen internodes, at a distance of about 4–7 centimeters, dull purplish-brown with a glaucous surface, but strongly marked with elongated brownish, narrow lenticels. The young leafy twigs and the pedicels and bracts are densely velvety. The anthers have a projecting appendage or rib at the back near the base.

This species resembles S. sarmentosus in flowering before the leaves appear, but differs in its erect, bushy habit, small flowers and more slender flowering branches. From S. schuchardti it differs in the lateral leafless inflorescence, the linear bracts and unequal calyx segments, in the latter nearly equalling the corolla tube, in the whole of the corolla being pubescent, in the much longer tails to the segments of the corolla, and in the pubescent glands. With sulphuric acid the section of the seeds gives the same rose color as the "white woolly" strophanthus seed of commerce. The velvety coating of the seeds hides the base of the awn, and, like that of the "white woolly" strophanthus seeds, the hairs look white when their bases are presented to the light, and brownish-fawn color when their apices are turned to the light. The average measurements of the seeds are the same.

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An adulteration of magnesium sulphate with zinc sulphate has been observed by P. A. Lamanna, *Boll. Chim. Farm.*, 36, 198. The zinc salt may be detected by the addition of one drop of solution of potassium ferricyanide to a solution of the suspected salt, when, if zinc is present, a brownish-yellow precipitate is produced.

# EXAMINATION OF POWDERED VEGETABLE DRUGS.

By Henry Kræmer.

Powdered drugs and "pressed herbs" will, no doubt, at a not very distant day, be the form in which most of the vegetable drugs will be bought and sold by the apothecary. It seems reasonable to suppose, however, that a few drugs, as licorice root, slippery elm bark, chamomile flowers, rhubarb, orris root, Canada snake root, senna leaves, manna, etc., will always be obtainable in a more or less crude condition, as most of these require that they be broken as little as possible for some of the purposes for which they are used. But even these may be ground and compressed into forms, as "rhubarb fingers," that may be in keeping with more elegant pharmacy. Some of the manufacturers, at least, of powdered vegetable drugs and "pressed herbs" have overcome probably nearly every objection that might be raised against their products. They have done, moreover, the art of healing an immense amount of good, inasmuch as their products are sold in proper containers or are wrapped so as to insure against the maximum amount of deterioration.

It is well known that the average pharmacist pays very little attention to the preservation of all his stock of crude vegetable drugs. The number of suitable containers are generally few, and the stock is necessarily in much greater excess of these. Those that have no proper receptacles, as well as the over-abundance of drugs purchased for which no suitable containers are provided, are wrapped in what is by no means impervious paper and stored away either on top of each other or side by side, or both, in an "out-of-the-way" place.

Some of the *advantages in the buying* of powdered drugs are:

(1) That they are ground by the manufacturer of pharmaceutical products to the fineness specified by the U. S. Pharmacopœia, or, when the drug is not official, to that which is generally used.

(2) The pharmacist is saved the expense for apparatus, as a drug-mill, sieves, etc.

(3) He furthermore saves time in grinding the crude drugs or attending to the same.

(4) The powdered drugs which he purchases are in impervious containers, and of such a form that he does not hesitate to place them on his shelves or his "out-of-the-way" place, be it the hottest part of his store (over the cases) or the most humid part.

(5) No additional expense may be felt by the pharmacist for securing other containers than those in which his products come to him.

Some of the *disadvantages in the purchasing* of powdered drugs are:

(1) That the drug in this condition costs from 5 to 50 per cent. more.

(2) The apprentice does not obtain the kind of practical experience in grinding drugs that will be always of inestimable value to him in determining either their identity or quality.

(3) The product which has been ground by someone else is likely to be more uncertain than one ground by the pharmacist himself from crude drugs of which he can so readily test the quality.

(4) There is at present no easy method for the average pharmacist to determine the purity of the powdered drugs he purchases.

Now, some pharmacists have the idea that a large sum of money must be expended in order to be able to grind one's own drugs—that, for instance, steam-power is necessary, an expensive mill must be provided and a special room set apart for doing this kind of work. The fact of the matter is that such an expensive and elaborate plant is impracticable as well as unnecessary. Comparatively little money need be expended to purchase a good hand-mill and the necessary sieves. With but very little outlay, the retail pharmacist can grind his own drugs and overcome the disadvantages above noted. It is not the object of this paper, however, to discourage the buying of powdered drugs or even to compare the expense of grinding either commercial drugs or those of one's own collecting with that of commercial powdered products, but to consider the qualitative and quantitative investigation of powdered drugs.

## QUALITATIVE EXAMINATION.

We are indebted particularly to the labors of Flückiger, Wigand, Vogl, Arthur Meyer, Moeller, Tschirch, Schrenck and others, who, during the past ten years, chiefly have given to us in their publications the characteristic structures of many of our crude drugs. All this has been necessary and is a preparation for the study of powdered drugs. While much has been done, even in the study of powdered products, there still remains much to be done in the study of both crude (particularly American) and powdered drugs. Several things are necessary for the study of powdered drugs:

(1) Suitable methods for the rapid discrimination and study of the characteristic tissues and contents of the powder. While sections of the fine particles can be made (by holding the particle between the forefinger and thumb and drawing the razor through the specimen), still this is laborious and requires considerable practice, time and confidence. It is, therefore, necessary to devise means and employ reagents which shall make the specimen transparent and not destroy either the tissues or contents that need to be seen. The most satisfactory reagent for general purposes in the hands of the writer has been the employment of the following solution:

CHLORAL-GLYCERIN SOLUTION.

Glycerin (C. P.) } equal parts.
Distilled water }
Chloral—sufficient to saturate the solution.

A few drops of this solution are placed on the slide and from 0·002 to 0·008 gramme of the powder added. The cover-glass is put on the specimen and the preparation is heated gently over either a spirit lamp, gas flame or oil lamp until it begins to boil. This is then allowed to cool and examined. If not sufficiently transparent it is heated again. This is generally not necessary, as with but one heating the tissues are transparent and contents may be examined. It is true that this treatment causes a slight swelling of the cell-wall, and is not applicable in testing for starch; but this reagent has the advantages of clearing the specimen and preventing it, without further treatment, from drying out.

When examining specimens containing starch another solution is used, as follows:

CHLORAL-GLYCERIN SOLUTION + IODINE.

Chloral-glycerin solution—any convenient quantity.
Iodine—a sufficient quantity is added to saturate the solution.

This solution is placed on the slide and the same quantity of powder used as before, but heat is not applied. The starch grains, with all of the characteristic markings, will be brought out and may be studied.

When lignified cells are sought, the powder must first be moistened with a drop or two of the following solution of anilin hydrochloride, and then after a few minutes a few drops of the chloral-glycerin solution may be added:

ANILIN HYDROCHLORIDE SOLUTION.

| | |
|---|---|
| Anilin hydrochloride | 5 gm. |
| Hydrochloric acid (C. P.) | 25 c.c. |
| Alcohol (95 per cent.) | 25 c.c. |
| Distilled water | 50 c.c. |

The anilin hydrochloride is dissolved in the alcohol, and to this solution the water containing the hydrochloric acid is added. When this solution is used, of course, crystals of calcium oxalate or calcium carbonate are destroyed.

The author is at present at work upon other solutions having the same principle in their composition as the above; but those mentioned are all that are necessary generally, and have been used with success.

(2) All investigators should record the size of the tissues or their contents in microns. The length of bast or wood fibres, size of pores, crystals, starch grains, stone cells, etc., are all more or less characteristic for the drugs we have to consider. It is not sufficient to say that drawings were made by the use of a $\frac{1}{5}$-inch objective and a 1-inch ocular. The objectives and oculars of the various makes of microscopes not only magnify differently, but the question of tube length is also important in this connection. But even if all of these data were given, it must be conceded as being tedious to the reader to calculate the size of the elements, which might be so easily done by the author. Even for an investigator to say that his drawings are magnified so many diameters does not give us the true and scientific idea of the elements which the author has seen and we are to use in the study of powdered drugs. We need records in microns of the size of tissues and constituents of drugs from many sources for comparison, so that another investigator may readily get at the facts. This is the only scientific method for the prosecution of this kind of work, and must be rigidly pursued by all.

(3) A scheme for the logical qualitative determination of a powder is necessary. It will be somewhat difficult to work out a scheme that will be of practical benefit, because it is necessary to begin with the consideration of the characteristics of all drugs and adulterants that may be used. It will not be possible, for instance, to separate the leaves from roots, etc., as is done in the study of crude drugs. Many points, such as color, taste, odor, as well as con-

stituents and structural characteristics must be considered. The author is at present engaged in a work having for its object the identification of a powder and quality of it, and hopes to have it completed during the coming year.

(4) Furthermore, it is necessary for all those who have to do with the training of the apprentice, and buying and selling of powdered drugs, to engage in the study of the same until the most satisfactory methods for determining the identification and quality be ascertained. In our educational institutions there is little or nothing being done, apparently, in this direction. It seems that the time is ripe for some time to be given to the study of powdered drugs in connection with that of crude drugs. This will undoubtedly be of the most practical benefit, as powdered drugs are already handled by most pharmacists to some extent at least.

This subject of the investigation of powdered drugs is one of great importance to-day. The older method of teaching pharmacognosy in this country must be supplanted by the new, having for its object the study of the powdered commercial drugs. This knowledge ought to be demanded by our State boards of pharmacy. It is in keeping, too, with the desires of the professional pharmacist, as it will tend to keep out the competing "merchant" and "grocer." Our "pure food laws" will require the pharmacist to know the value of the drugs and foods he sells. This may be required also of the grocer, but he can buy and sell in original packages. The pharmacist is hardly in the same position, as he cannot always dispense in original packages, and he is responsible for the purity of the goods that he possesses and sells. The conscientious pharmacist wants this knowledge, desires stringent examinations and just laws, and will in his everyday dealings live up to what he knows. He has nothing to lose; it is only the incompetent or dishonest dealer in drugs and foods who will suffer.

QUANTITATIVE EXAMINATION.

In a paper presented to the A.Ph.A. in 1894, a preliminary notice of a method for securing approximate quantitative results of the examination of a powder by means of the microscope was given. After a few years of deliberation and some practice the principles of the process are somewhat more satisfactorily developed and the results will be given. Since 1894 the results of several workers—Day

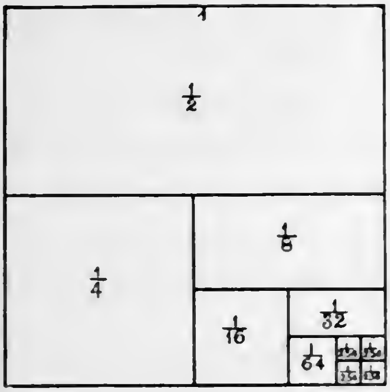
(A.Ph.A. Proc., 1896) and Kebler (AMER. JOUR. PHARM., 1897, p. 244)—as well as the labors of some students during the past year, indicate that the principle of the process suggested is satisfactory, whatever the modifications recommended. The following are the important points embracing the principles of the process as developed thus far:

(1) The same *reagents* and mounting media are employed in doing quantitative work as were considered in the qualitative examination of the powder. In quantitative work, not only some, but *all* of the important characteristic tissues and contents are to be rendered visible.

(2) The quantity of powder to be examined by means of the microscope must represent the sample in every particular; in other words, the *sampling must be done properly* and in accordance with the methods used in the assay of ores. While the quantity to be examined may consist of but a few grammes, it must thoroughly represent the lot of powder on which value is to be given.

(3) The standard powders, with which the powder under investigation is to be compared, must thoroughly represent the drug in the various ways in which it may be treated. The degree of fineness must especially be carefully borne in mind. A sample of a drug of No. 40 powder cannot be compared with one of No. 60. If the sample of a drug to be examined is of a No. 40 powder, the standards must also be of the same degree of fineness. If extraction of active principles is suspected in the powder, it must be compared with a standard that has been extracted. In fact, *every treatment that is possible in a sample to be analyzed must be given to a standard, if possible, with which the comparison is made.*

(4) The amount of powder used in the examination is generally about $\frac{1}{256}$ gramme (= 0·0039 gramme = 0·06 grain). In some cases twice this quantity ($\frac{1}{128}$ gramme) or but one-half this amount ($\frac{1}{512}$ gramme) may be used to greater advantage. The quantity of powder may be weighed out, or, what is more convenient, with practice a gramme is weighed out and divided with a spatula with the eye, as follows:




½ = 0·500 gramme.
¼ = 0·250 "
⅛ = 0·125 "
$\frac{1}{16}$ = 0·0625 "
$\frac{1}{32}$ = 0·03125 "
$\frac{1}{128}$ = 0·0078 "
$\frac{1}{256}$ = 0·0039 "

(5) The cover-glasses used, whether round or square, *should be uniform in size and thickness* for comparison of the mounts of the standard with those of the specimen to be tested.

(6) The *amount of reagent* employed in making a mount must be just sufficient to float the cover-glass, and as few air-bubbles as possible are permitted to be formed.

(7) *A homogeneous mixture* of powder with reagent must be formed before the cover-glass is put down. This is best done by taking the edge of the cover-glass in a pair of forceps and distributing the powder in the mounting media or reagent.

(8) After the mount has been made and the powder examined previously qualitatively, the quantitative estimation of the powder is determined. This is based on one or more of the structures or constituents that are characteristic of the drug or drugs that may be present. A few examples may be given :

In *Cinchona*, the bast fibres are best selected.

In *Quillaja*, the monoclinic calcium oxalate crystals are most characteristic.

In *Belladonnæ folia*, the pieces of tissues, with some cells containing the characteristic grayish sand-like crystals of calcium oxalate, are selected.

In *Hyoscyami folia*, the pieces of tissues, with some cells containing the characteristic cubical or tetragonal crystals of calcium oxalate, are used.

In *Stramonii folia*, the pieces of tissues, with some cells containing the characteristic "rosette-shaped" crystals of calcium oxalate, are most characteristic.

In *Zingiber*, the estimation is based on the starch grains, or better, the oil-secreting cells.

In *Scilla*, the number of cells with groups of acicular crystals are best selected.

In *Belladonnæ radix*, the starch grains are most easily used, but it must be borne in mind that there are several kinds of Belladonna root in the market.

In *Nux Vomica*, the lignified hairs are most characteristic.

In *Rheum*, the large "rosette-shaped" crystals of calcium oxalate are best selected.

In *Caryophyllus*, the oil-secreting reservoirs are used.

In *Cinnamomum*, the groups of stone cells or starch grains are characteristic, taken in connection with the presence or absence of cork cells.

In *Sarsaparilla*, the starch grains are considered after the kind of root has been ascertained.

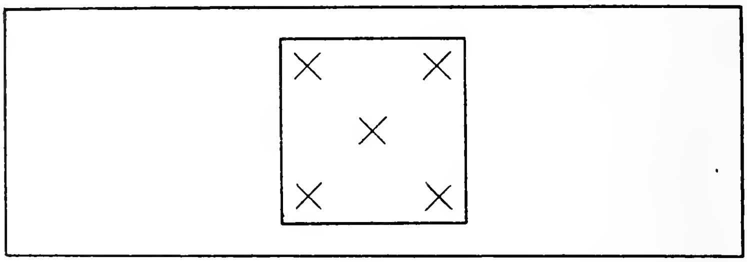


FIG. 2.

In *Glycyrrhiza*, the characteristic fibres with calcium oxalate crystals adjoining them, or the starch grains, are employed.

(9) The method consists in counting the number of characteristic elements in several portions of the slide, and may be performed in several ways:

(*a*) By the use of an ocular micrometer ruled in 100 square millimeters, as proposed in 1894. Five portions, at least, of the mount are examined, as in the places marked X (*Fig. 2*).

The number of characteristic elements that appear in each of these places in certain portions of the ocular micrometer are counted, as, for instance, those that appear in the square millimeters marked X (*Fig. 3*).

The low power (½ to ⅔-inch objective) is used in some cases, as in the estimation of rheum, scilla, etc.; but in most instances, especially when starch grains are to be counted, a higher power (¼ to ⅛-inch objective) is preferred, as in Belladonnæ radix, Zingiber, etc.

(*b*) While these ocular micrometers ruled in square millimeters are easily made, still the makers of microscopical accessories charge such a very high price for the same that it has been found desirable to devise another way for doing the same kind of work. An ordinary ocular micrometer divided into tenths of millimeters is taken, and the number of elements between the outer portions, ruled to a less number of divisions (as those marked X, *Fig. 4*), are counted.

It is better, when using this ocular micrometer, to turn the latter around 180° after counting in the one direction, and counting again. In other words, an additional count is made, *i. e.*, ten are made upon each mount.

(*c*) There are some cases when it is not desirable to use either (*a*) or (*b*), as when the elements or tissues are so large that it is more practicable to exclude the ocular micrometers, and to count all of the tissues or constituents as they appear in the whole field of view of X in *Fig. 1*.

The low power (⅔ to ½ inch) may be used sometimes, as in the

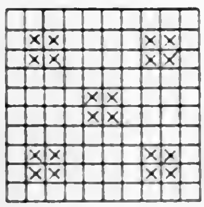


FIG. 3.

estimation of cinchona, quillaja, glycyrrhiza, etc., while in other drugs, as Hyoscyami folia, Belladonnæ folia, etc., a higher power ($\frac{1}{4}$ to $\frac{1}{8}$) is used.

(10) *The number of mounts* to be made of the standard and the powder under examination should generally not be less than twelve each. But as two to three mounts can be made upon the same slide, from four to six slides only are necessary for each powder.

(11) If the powder is found to be a mixture, a similar compound, representing the proportions found, should be made up, and the powder under investigation be compared with it.

(12) It is apparent that the quantitative results are purely comparisons of an unknown with a known powder. The conditions must be nearly the same in both. The sampling must be done similarly; the same amount of powder must be used in both, and

no more reagent or mounting media should be used than is necessary to hold the cover-glass without any air being impinged. The same microscope and powers, as well as other conditions, must be employed to secure even *approximate results*, as this is *all that can be expected at present.*

It would be useless for the author to record some of his standards and results; but it no doubt will be profitable to give the records of one or two instances where a number have worked upon the same powder.

STANDARD OF NUX VOMICA.

| No. | | Hairs. |
|---|---|---|
| 1. | Mean of 10 readings | 12 |
| 2. | " 8 " | 12⅓ |
| 3. | " 10 " | 10·9 |

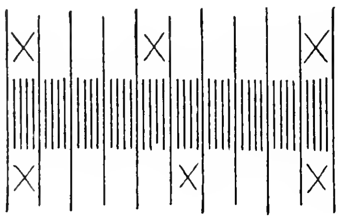


FIG. 4.

A sample of cinchona, that contained 75 per cent. of cinchona and 25 per cent. of wheat starch, was assayed by the process given under 9 (*b*) for starch and 9 (*c*) for bast fibres, and gave the following results to nine different workers:

| No. | | Cinchona. Per Cent. | Starch. Per Cent. |
|---|---|---|---|
| 1. | Mean of 20 readings | 74 | 23 |
| 2. | " 10 " | 67 | — |
| 3. | " 20 " | 82 | 25 |
| 4. | " 12 " | 77 | 28 |
| 5. | " 16 " | 66 | 35 |
| 6. | " 12 " | 77 | 27 |
| 7. | " 11 " | 69 | 23 |
| 8. | " 20 " | 80 | 30 |
| 9. | " 28 " | 75 | 22 |
| Total | " 149 " | 74·11 | 26·66 |

*Conclusion.*—We need more effective work in the qualitative study of powdered drugs, and we have some recent evidences that this will be done in this country.

Approximate quantitative results may be obtained in the examination of unknown powders by the methods given. There are some cases, at least, where the quantitative determinations of admixtures and adulterations, if they are to be determined at all, can be done so only by means of a microscopical method.

It is possible that a microscopical separation of active principles may be effected of both drugs as well as their preparations. This would be the desideratum in quantitative microscopical work. Thus far, the work of the author has been unsatisfactory in this direction, because, while at times results come, still the products disappear as quickly, owing no doubt to microscopic conditions of heat and moisture altering the products formed.

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## KINOS.[1]

By Joseph Bosisto, C.M.G.

The question whether the place of the official variety of kino, which is now almost unobtainable, can be effectively supplied by others met with in commerce (B.P.C. Blue List, No. 49), is answered from Victoria, Australia, to the following extent. Although the Pterocarpus marsupium, and other species of the natural order Leguminosæ yielding kino, are not known to exist in Australia, yet the natural order Myrtaceæ, which exists throughout Australia, contains many species which exude kinos and some catechus. Those have not, so far (save and except one), been found of commercial value, owing to their sparse solubility in water, and in all other known cheap solvents. This arises from the gum kino not being collected within a few days after its appearance on the outer bark. The extreme bright sunlight of Australia, together with the warm thermal lines existing both night and day, causes it rapidly to degenerate into a degraded bassorin, which is insoluble.

Quantities of such kinos exist throughout Australia, obtainable chiefly from Eucalyptus marginata, E. amygdalina, E. sideroxylon, E. fissilis, and many others. The one I have already indicated is Eucalyptus rostrata, from which is exported annually about two tons of its gum; this is almost entirely soluble in water, and is a true kino. It is mentioned in Squire's "Companion to the B.P.," 1882, and in Martindale's "Extra Pharmacopœia," as gummi rubrum from Eucalyptus rostrata.

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[1] *Pharmaceutical Journal*, August 28, 1897.

Eucalyptus rostrata is one of the leading trees in many of the forests of Victoria, and is productive of this kinic substance, which, being unable to force its way through the hard, tough outer bark, lodges itself in treacly form in large orifices or carbuncles between the wood and the bark in such quantities that I have known one and two bucketfuls of the liquid to be obtained by boring a small orifice in the swollen part. This liquid kino, when evaporated in a vacuum pan, is obtained as beautiful ruby-red gum kino entirely soluble in water or spirit. The supply from Australia would be very great if only a remunerative market opened.

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## ARALIA NUDICAULIS.[1]

By William C. Alpers and Benjamin L. Murray.

Aralia nudicaulis grows abundantly in the New England and Middle States, extending north into Canada, south as far as North Carolina, and west to the Mississippi Valley, selecting principally rich hilly woods. It is indigenous to the United States, not being mentioned in European text-books, and has a number of synonyms, as wild licorice, shotbush, small spikenard, false sarsaparilla, Virginia sarsaparilla, and wild sarsaparilla, the latter being the term more commonly used. While country people know this aromatic herb well under the name of wild sarsaparilla, or simply sarsaparilla, and use it "to purify the blood and cleanse the skin," it has attracted but little attention by the medical profession; its only use in medicine seems to be to serve as an adulterant of the official sarsaparilla, in several lots of which, purchased in the New York market, the writers have discovered it.

The late Professor Bastin examined Aralia nudicaulis microscopically, and published the results of his examination in *The Western Druggist*, Vol. VII, 1885, p. 314. This is the only literature that the writers were able to find on this interesting plant, and a chemical examination of its rhizome was probably never made before. There is a slight difference in the description of the leaves and the rhizome between Bastin's paper and ours, which suggests the idea that possibly the Western species varies from the Eastern, Bastin having collected his specimens in the vicinity of Chicago, while

[1] Read at the annual meeting of the American Pharmaceutical Association, August, 1897.

ours were gathered near New York. Bastin, for instance, says that the rhizome will reach a length of from 3 to 5 feet, and Gray, in his text-books, makes the same statement, while we have hardly found any rhizome shorter than 5 feet, and have a specimen here of 29 feet. The description of the leaves also shows some points of difference, the leaves of our specimens being more divided than the ones that Bastin describes. This latter observation was also made by Professor A. C. Apgar, who proposed the name of *Aralia nudicaulis prolifera* (*Bull. Torr. Bot. Cl.*, 14: 166, 1887) for the species found in New Jersey, while Professor N. Britton, in his "Illustrated Flora," calls this kind "a mere form."

BOTANY.

*Aralia nudicaulis* belongs to the order Araliaceæ, and shares with the other members of the order the warm, aromatic, almost pungent, taste of some parts, principally the rhizome. Early in the spring a petiole and a scape grow near each other from the rhizome, which lies from 1 to 4 inches under the ground, and only rises occasionally a little above the soil. The straight petiole, swollen at the base, rises from 8 to 18 inches high and divides into three

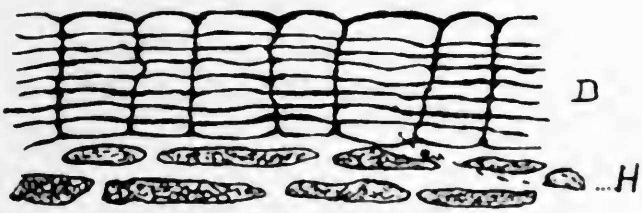


*Fig. 1.*—Corky layer of old bark, cross-section.

divisions, which at this point of divergence thicken like the base of the main petiole; each division bears a compound leaf of from three to five leaflets. Occasionally one of the lower leaflets is again compound. The leaflets are from 2 to 5 inches long, and from 1 to 2½ inches wide, pinnate with one terminal one, the lower pair on short petioles, the upper one mostly sessile, oblong-ovate, one of the lower ones occasionally almost round, acuminate, finely serrate, smooth on both surfaces. The scape is a few inches shorter than the petiole, and therefore, together with the flower, or later, the fruit, hidden under the spreading leaves. It has neither leaf nor bract, hence the name nudicaulis, and bears from three to seven

small, simple umbels, each consisting of from five to twenty-five greenish flowers. Occasionally there is one or more odd flowers, with rather long stalks growing at right angles out of the scape below or between the umbels. The flowers are perfect or polygamous, with both fertile and sterile ones on the same plant. The calyx is destitute of lobes or teeth; the petals, stamens, and styles are five in number. During the summer a dark purple, nearly black, drupe develops about one-fourth of an inch in diameter. This fruit is probably a welcome food for birds, as it disappears soon after ripening, and can only seldom be found on the ground under the

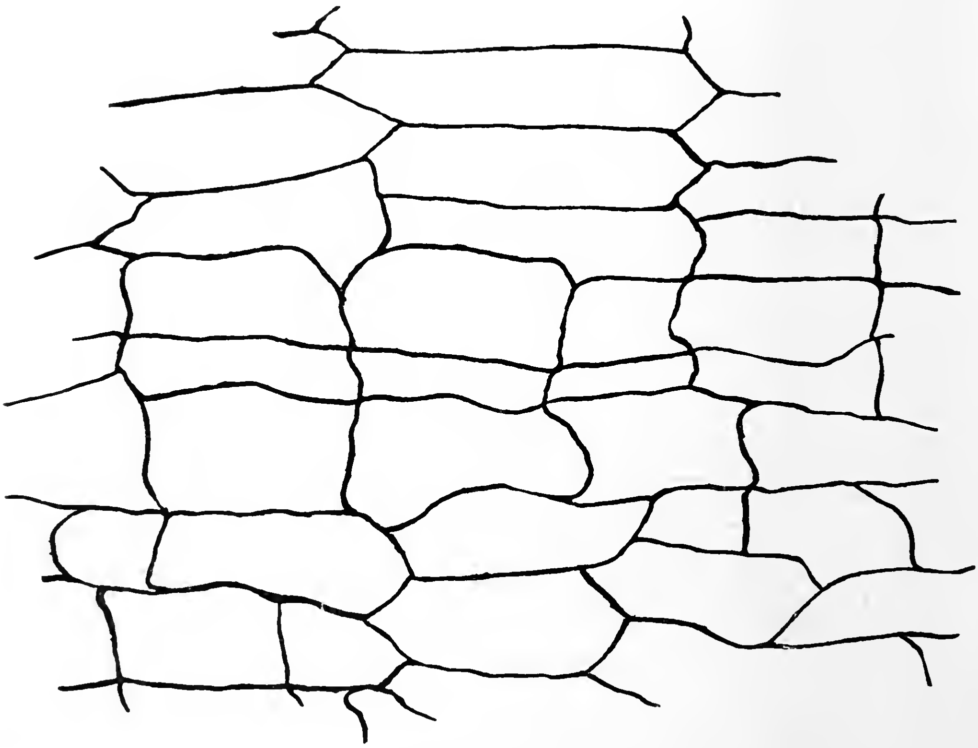

*Fig. 2.*—Outer bark, longitudinal section.

leaves. It does not seem to serve for the propagation of the plant, the creeping root-stock performing this function.

The most interesting part in which the peculiar aroma of the plant is best noticeable is the rhizome. It grows horizontally and spreads very quickly over a large area, reaching a length of more than 25 feet, branching abundantly and producing small hairy rootlets rather sparingly. The parts of the rhizome that rise out of the soil harden and afterwards die off, producing by their decadence two new growing plants in place of one. The rhizome is nearly

cylindrical, with many concave leaf-scars, corresponding in shape to the swollen end of the petioles. The outer, very thin, grayish, somewhat glossy layer of the bark is easily detachable, and the lower, thick, fibrous layer can readily be peeled off the white or slightly yellowish wood, as long as the rhizome is fresh and moist. A white and spongy pith forms the interior of the wood. On drying, the rhizome becomes wrinkled and brittle, and is from ¼ to ½ inch in diameter. The taste of the fresh rhizome is peculiarly aromatic, similar to that of ginseng, leaving no bad after-taste.

MICROSCOPY.

A cross-section of a segment of the rhizome shows under the microscope three distinct parts, the pith, the wood and the bark. The pith consists of rather large, granular cells, containing starch with occasional crystals of oxalate of calcium.

The pith is surrounded by a wood zone which varies in thickness according to the age of the specimen. In old rhizomes the wood is about twice as thick as the bark, while in very young specimens a cross-section shows a large pith, a thick bark, and very little wood.

The thick-walled woody edges of irregular size are separated by medullary rays of one or two rows of cells. Sometimes these rays are prolonged into the bark. A layer of cambium cells in a double row surrounds the wood.

The bark consists of a fibrous layer, a corky layer and an epidermis. The parenchyma cells are rich in starch and contain, like the pith, crystals of calcium oxalate. The characteristic part of the fibrous layer of the bark is the great number of oil or resin cells, the largest cells of the plant, resembling tubes that can often be traced quite a distance in longitudinal sections. They are intrenched by a wall of small cells that undoubtedly secrete oil and resin, while the large inner cells serve as reservoirs. The medullary rays often extend into this layer, taking an irregular, somewhat tortuous course, and sometimes their two rows of cells separate and encase one of these large oil cells. The resin is probably held in solution by the oil. Between the fibrous and corky layers of the bark, a double row of peculiarly shaped cells are observable, probably a layer of phellogen.

The corky cells are empty and rather large, presenting no points of particular interest. A thin epidermis covers the corky layer, easily detachable and often wanting.

CHEMISTRY.

Samples of Aralia nudicaulis were gathered in the fall in the hilly woods in Bergen County, N. J., and most of the chemical examinations were made on these samples. A further supply was collected in the following spring, when the flowers of the plant were in bloom.

The general plan of the work was:

(1) To determine the presence or absence of alkaloids or glucosides.

(2) To determine the presence of other important constituents.

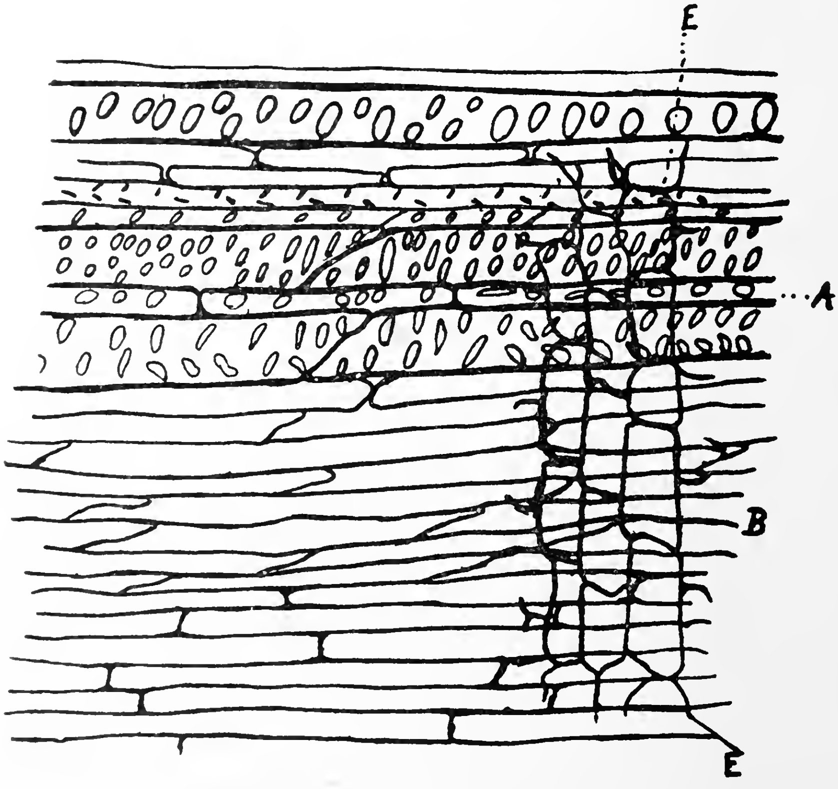


*Fig. 3.*—Wood, from pith to bark, longitudinal section.

(3) To undertake a systematic analysis and estimation of the constituents.

For the first part of the work, testing for alkaloids and glucosides, samples of the drug gathered in the fall as well as in the spring were finely ground and digested for three days in a closely stoppered flask with Prollius' fluid. After filtering, the liquid was treated with acidulated water (sulphuric acid 1 part, water 5 parts) and the aqueous liquid submitted to examination. Wagner's reagent, tannin,

picric acid, platinic chloride, sodium phospho-molydate, and Mayer's reagent, gave no precipitate. All the tests were repeatedly verified by using larger quantities of acidulous solutions.

For the further determination of important constituents, together with alkaloids and glucosides, the following experiments were made:

Large samples of the finely ground rhizome of the plant, gathered both in spring and fall, were digested in benzene for three days. After filtering and evaporating to dryness, a yellowish-brown, resinous mass was obtained. This residue was treated with warm water, filtered and tested for alkaloids, glucosides and organic acids. The still insoluble residue was treated with acidulous water, and this acidulous liquid tested like the preceding one. The reagents applied were salts of lead and calcium, tannic acid, Wagner's reagent, platinic chloride, gelatin solution, and Fehling's solution. No reaction was obtained, except a slight change of color in Fehling's solution. To still further verify the above results and avoid the uncertain action of water upon the resinous matter, which became soft with heating, another benzene extract was made and treated directly with water and then with acidulated water. These aqueous solutions caused no new changes, the color of Fehling's solution alone being affected.

Tests for tannin were then made. A finely ground sample of the drug was digested with a good grade of absolute alcohol and the liquid filtered. This alcoholic liquid caused a slight reduction of Fehling's solution, and likewise precipitated a solution of gelatine, starch paste, and antimony and potassium tartrate. A solution of potassium hydrate was darkened, a solution of potassium permanganate reduced in about two minutes, solution of silver nitrate reduced, and a solution of ferric chloride rendered green. Confirmatory tests were made on two additional samples of the drug, in both cases with the same result. The same reagents were also applied to the alcohol alone, used for digesting, without showing any reaction. The presence of a small percentage of tannin was therefore determined.

The residue of the drug left in the experiment mentioned above, after treating the Aralia with absolute alcohol, was washed thoroughly with more absolute alcohol, dried, and then digested twenty-four hours in cold water. The aqueous liquid after filtration was of

brown color. Upon application of heat it reduced Fehling's solution and precipitated with a solution of basic acetate of lead, with a solution of borax, with alcohol, and with ether. With a solution of ferric chloride in the cold it caused no precipitate. The presence of mucilaginous matter was thus shown.

As the next experiment, a sample of coarsely cut Aralia nudicaulis was distilled with steam, the distillate showing the presence of an agreeable-smelling volatile oil. The liquid comes over milky,

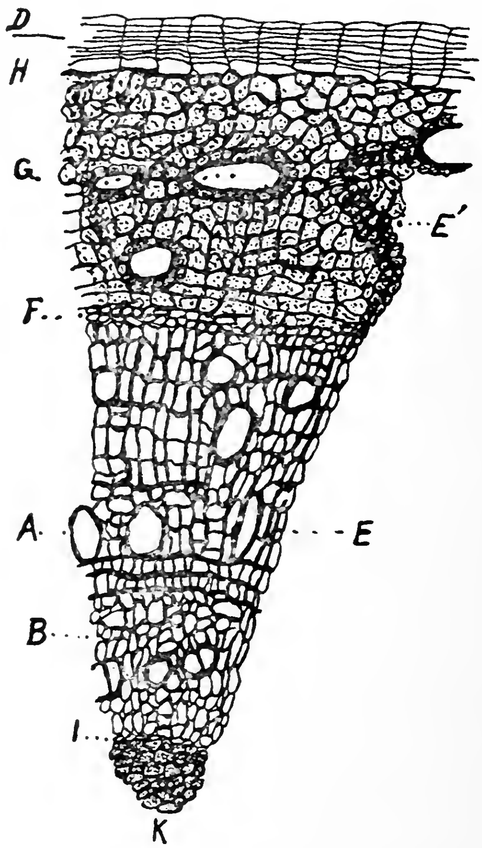


*Fig. 4.*—Entire rhizome, segment, cross-section.

*A*, pitted vessels; *B*, lignified cells; *D*, cork cells; *E*, medullary rays; *E'* medullary rays, prolonged into bark; *F*, cambium layer; *G*, resin and oil cells; *H*, phellogen; *D* to *F*, bark; *F* to *I*, wood; *I* to *K*, pith.

and oily globules soon collect, floating upon the surface. The microscopical examination had already revealed that this oil resides in the bark of the rhizome, and upon distilling some of the fresh bark alone, without the wood and pith of the rhizome, quite appreciable quantities of oil were found.

Whether the rhizome gathered in the fall contains more or less

volatile oil than the spring drug has not been determined; our impression, based on the odor and taste of the samples of various seasons, is, however, that the oil is more abundant in the fall than in the spring. In working with the fresh bark alone the distillate became more milky and the oil-drops solidified at about 20° C., showing a light yellow color. Further investigations of this oily portion led us to believe that some of the resins present in the plant were carried over in the distillation, though precautions were taken against it. The odor of the oil is persistent and gives the drug its characteristic smell, noticeable even in the air of places where the plant grows abundantly.

After having determined the absence of alkaloids and glucosides, and the presence of tannin, starch, volatile oil and resins in the rhizome of Aralia nudicaulis, examinations were made for some of the more important constituents according to Parson's scheme. At a temperature of 98° to 100° C., the drug lost 6·50 per cent. of moisture, and the dry sample, on which all future percentage calculations were based, contained, on incineration, 5·47 per cent. of ash. This ash yielded 24·82 per cent., equal to 1·36 per cent. of the original dry sample, of soluble matter, consisting of chlorides and sulphates of sodium and potassium. The drug yields to chloroform 3·38 per cent. of a soft, brown, resinous and oily matter. This chloroformic extract was dried for two months over sulphuric acid without hardening. At a temperature of 110° C., it suffered a loss equal to 0·33 per cent. of the original dry drug, which amount represents the volatile oil present. Subsequent estimations of this oil were not successful.

After the treatment with chloroform, the residue was exhausted with 80 per cent. alcohol, yielding 8·75 per cent. of brown resinous matter, of which 6·66 per cent. was ash. The portion of this alcoholic extract, soluble in absolute alcohol, and again soluble in water, forming neutral solutions, gives tests with the following reagents for tannin: Basic acetate of lead—light yellowish precipitate; gelatine, starch, potassium and antimony tartrate—precipitates; potassium permanganate, silver nitrate—reductions; ferric chloride—green color. Further examination of this extract, omitting confusing details, shows the presence of acid resins and indications of neutral resins. An organic acid is also present.

After the chloroform and alcohol extractions, a water extract was

made, yielding 3·58 per cent. of the dry Aralia, of which 24·36 per cent. was ash.

The next extraction, made with an acid menstruum of 1 part of sulphuric acid and 5 parts of water, yielded 56·10 per cent. with 11·67 per cent. of ash.

The final extraction, with an alkaline menstruum, yielded 6·89 per cent.

As a summary the following table is presented:

| Extract with | Percentage of dry drug. | Containing |
|---|---|---|
| Chloroform . . . | 3·38 | Resin, 3·05 per cent.; oil, 0·33 per cent. |
| Alcohol, 80 per cent. | 8·75 | Tannin; organic acid; acid resin (neutral resin ?). |
| Water . . . . | 3·58 | Albuminous bodies; coloring matter. |
| Acid $\frac{1}{5}$, water $\frac{4}{5}$ . . | 56·10 | Mucilaginous matter. |
| Alkaline solution . | 6·89 | Crude fibres, etc. |
| (By subtraction) . | 21·30 | Cellulose. |
| | 100·00 | |

Further investigation will be conducted, especially on the oil and resins in which the active medicinal properties seem to reside.

PHARMACEUTICAL PREPARATIONS.

A quantity of the fresh rhizome of *Aralia nudicaulis*, gathered in the fall, was digested with alcohol, according to the directions of the Pharmacopœia for making fresh tinctures. This tincture, Tinctura Araliæ Nudicaulis Recentis, after standing nearly a year, exposed to the varying temperatures of winter and summer, showed no precipitate, and possessed the odor and taste of the plant in a marked degree. Mixed with water it forms a milky precipitate indicating the presence of oil and resin. It has a beautiful gold-yellow color which seems to be permanent. A fluid extract was prepared from the rhizome gathered in the spring. A menstruum of 4 parts of alcohol and 1 of water was used, and the general directions of the Pharmacopœia for making fluid extracts were followed. The evaporization of the second percolate was performed at a very low temperature, in order not to drive off oily or resinous parts. The fluid extract resembles the tincture, but is darker,

owing to the solution of the coloring matter of the plant, and is more aromatic.

Although this fluid extract appears to be an elegant and highly concentrated preparation, and to possess all the properties of the drug, it is doubtful, in the writers' minds, if therapeutically it would be the most desirable form of administering the drug. If the virtues of the drug depend, as we believe, on the oil and resins, the separation of these constituents, if possible, seems to be the most advisable step. The properties of the drug, judging from some crude experiments, seem to be stimulant, diaphoretic, and probably neurotic.

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## THE IMPORTANT CONSTITUENTS OF TARAXACUM ROOT.[1]

By L. E. Sayre.

According to the promise made at the meeting of this Section last year, the investigation upon Taraxacum has been continued. It was begun, not without considerable misgiving, but with the hope that some process for crystallizing the bitter principle would be found, so that a more accurate study of its chemical and physical properties could be accomplished, and that a method of accurately standardizing this much-used drug could be furnished.

Briefly summarizing the work of which this is a continuation, it will be seen, by referring to the papers previously published in the Association Proceedings,[2] that the following constituents, among others less important, have been identified: (1) A resin soluble in chloroform and ether, insoluble in alcohol; (2) A resin soluble in alcohol; (3) Taraxacerin, a white, waxy substance, separating from alcoholic solution in cauliflower-like forms; (4) A bitter principle, which, in somewhat concentrated solution, is precipitated by a number of alkaloidal reagents. Solutions containing the seemingly pure principle, when evaporated, produced a film which, under the microscope, revealed oftentimes crystals of acicular form mixed with globules of oleoresinous appearance. When this mixture was treated with oxidizing agents—even by hydrogen peroxide—it was gradually converted into a crystalline mass, which proved to be oxalic acid. Attempts to separate the crystals found in the unoxi-

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[1] Presented at the meeting of the American Pharmaceutical Association, 1897.
[2] See Proc. A. Ph. A., 1896, p. 160.

dized evaporate were unsuccessful. To decide whether these crystals or the oily globules were the bitter principle, or whether the one was derived from the other, was little more than a conjecture. Slow evaporations of chloroformic, ethereal, alcoholic and aqueous solutions failed to produce crystals free from oleoresinous globules. Evaporation of aqueous solution in vacuo was no more successful.

The work was begun this year by making an ultimate analysis of taraxacerin. Slowly evaporating its impure alcoholic solution, the cauliflower-like crystals separated as stated in paper of last year. The taraxacerin thus freed from extraneous matter was collected, dried over sulphuric acid, and a number of combustions made. The result of these combustions will be subjoined to this paper. A quantitative analysis of the inorganic constituents of taraxacum root will also be appended.

For the further investigation of the bitter principle an extraction of taraxacum root was made for me by J. U. Lloyd, as follows: Forty pounds of the powdered root were percolated with chloroform, and the dregs were then exhausted with alcohol. The chloroformic and alcoholic tinctures were separately distilled, leaving behind in each case a residue of thick, syrupy consistence. These syrupy extractives were used as a starting point for the further investigation of taraxacin and other constituents.

*Taraxacin, Bitter Principle.*—Further efforts have been made to bring the bitter principle to the crystalline form. Thus far these efforts have been only partially successful; a detailed description of this work is unnecessary. Suffice it to say for the present, acetone as a solvent seems to promise some aid in its isolation. An acetone solution of the yellowish, amorphous, viscid and extremely bitter extractive (corresponding to crude taraxacin) was made. On slowly evaporating this solution, a thin, syrupy, transparent film was left which contained imperfectly formed stellar crystals—tufts imbedded in viscid media. On adding a drop of water, the film and crystals immediately broke down into yellowish oleoresinous-like globules. The most satisfactory method thus far employed for purifying this principle is to dissolve the crude principle (extractive) in 20 per cent. alcohol; treat this with specially purified animal charcoal until the solution loses its bitterness; carefully wash the carbon with water; dry, and treat it with boiling alcohol; evaporate the alcoholic

solution at a low temperature, and dry the residue over sulphuric acid. This has, however, the disadvantage of being a wasteful process. The dried product dissolved in acetone behaves as stated above.

Although the crystallization of taraxacin at present seems almost impossible, it has not been given up as hopeless.

*Analysis of Taraxacerin.*—The result of the combustion of this principle may be here stated. Several combustions were made, but only three recorded; of these three, the second and third seemed to be the most reliable. A tabular statement of the percentages is as follows:

| | 1. | 2. | 3. |
|---|---|---|---|
| Carbon | 77·36 | 77·16 | 77·32 |
| Hydrogen | 11·55 | 11·13 | 11·13 |
| Oxygen | 11·09 | 11·71 | 11·55 |

| Mean of 1, 2, 3: | | Mean of 2 and 3: | |
|---|---|---|---|
| C | 77·28 | C | 77·24 |
| H | 11·27 | H | 11·13 |
| O | 11·45 | O | 11·63 |

Reducing the percentages of the last table, the following amounts appear:

$$C = \frac{77·24}{11·92} = 6·4803 \qquad \frac{6·4803}{·7324} = 8·85$$

$$H = \frac{11·13}{1} = 11·13 \qquad \frac{11·13}{·7324} = 15·20$$

$$O = \frac{11·63}{15·88} = ·7324 \qquad \frac{·7324}{·7324} = 1·00$$

Taraxacerin would therefore correspond to the empirical formula $C_9H_{15}O$, or a multiple thereof.

The melting point of this substance was about 45° C. Its chemistry will probably be worked out in detail in the future. For aid in this work in combustion I am especially indebted to Mr. W. M. Whitten, Assistant in Chemistry of the Kansas University, who promises in the future to aid in its further study.

*Inorganic Constituents of Taraxacum Root.*—Ash in dried root (dried at 100° C.). 11·13 per cent.

CONSTITUENTS OF ASH.

| | Per cent. |
|---|---|
| $SiO_2$ and sand | 43·27 |
| $Al_2O_3$ | 18·07 |
| $Fe_2O_3$ | 0·80 |

| | Per cent. |
|---|---|
| $CaO$ | 5·75 |
| $MgO$ | 6·60 |
| $K_2O$ | 13·83 |
| $SO_4$ | 4·22 |
| $P_2O_5$ | trace. |
| $CO_2$ | 6·53 |
| $Cl$ | 1·20 |
| Total | 10·027 |

This latter work was performed by Mr. C. M. Palmer, a senior student of the School of Pharmacy.

The examination of the chloroformic and alcoholic extractions was carried beyond the report made in this communication, but the interesting work is not yet completed, and will be made the subject of another paper at the coming meeting of the society.

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## RECENT LITERATURE RELATING TO PHARMACY.

### SYNTHETIC REMEDIES.

*Lactophenin*, according to Dr. George Thompson (*Universal Medical Journal*, August, 1897), possesses several advantages over phenacetin. As is well known, lactophenin is a definite chemical compound, differing from phenacetin by containing lactic instead of acetic acid. The substitution of lactic acid, it is claimed, overcomes almost entirely the possibility of cardiac depression or the conversion of hæmoglobin into methæmoglobin, an attribute only too frequently met with in antipyrin, acetanilid and phenacetin. As an analgesic it is equal, according to the author, to the best pain reliever in the materia medica, and it may be given with confidence in neuralgia from any other cause than traumatic.

*Thiol* has been found by Dr. Wirz (*Deut. Med. Wochenschrift*, July, 1897) to be superior to ichthyol in some hundreds of cases. It is odorless, so that patients who could not bear the odor of ichthyol improved under thiol. It can be used in every description of inflammation, in carbuncles, erysipelas, typhilitis, furunculosis, etc. The best results are obtained with liquid thiol as supplied by the manufacturers, not by that prepared from powdered thiol with an addition of water.

# EDITORIAL.

## READ BY TITLE.

The custom of reading papers by titles before the sections of the American Pharmaceutical Association is a growing one, and, at the same time, it is one much to be deplored. For what purpose is a paper presented to a scientific body unless it be for the discussion? The matter of publication is a secondary one; for, if valuable, the paper finds its way into print rapidly enough, either in part or in abstract. From the journals in which it appears it is copied by foreign periodicals, and thus it becomes distributed over a large part of the world. Except for purposes of reference, the paper has served its purpose long before the bulky Proceedings appear. If, for any reason, the title is the only accessible part of a paper at the meeting, and thereby the journals fail to print it, it takes a short cut to oblivion; for neither journals nor individuals ever attempt to do anything with papers after they appear in the Proceedings; they are considered stale by that time, and certainly foreign journals never abstract from such a source; they would be pretty sure to be reprinting old matter, and avoid it.

At the recent meeting of the American Pharmaceutical Association, over twenty papers were presented to the Scientific Section, yet something like half of these were read by title and passed on to obscurity. Some others were crowded into the Section on Education and Legislation, and one has appeared *in full* in at least one drug journal as having been presented, which was only read in abstract by the author, he having decided, after reaching the meeting, to withhold part of it for one year.

Presumably the sessions of the Association lasted a week. The work, however, was condensed into parts of five days; still there was, apparently, not time to read and discuss the papers presented to the two sections, amounting to something over thirty. It has been said that this was due to an accident, whereby certain social features occurred concurrent with the sessions of the Scientific Section, but such accidents occur almost every year. Members must naturally ask themselves whether attendance at the American Pharmaceutical Association is to listen to and discuss papers or to take trolley rides. In the case referred to, the members elected in favor of the trolley, and the work which was mapped out for three sessions was crowded into one and continued past the midnight hour, with everybody tired out after a day of sightseeing. Naturally, the man who travelled 1,000 or 2,000 miles to attend the meeting was disgusted.

The fact has been deplored that the retail pharmacist is every year becoming more conspicuous by his absence from the meetings. He attends the sessions for the purpose of learning something that will be of value to him in his business. In what part of the programme will he find it? Certainly not in that devoted to social features.

The real earnest members are not unreasonable in requesting that no social features be introduced until all the business has been transacted, or else that there be no simultaneous meetings for business and pleasure. Papers should be in the hands of the chairman of the section to which they are to be presented, at least ten days before the meeting, and an abstract only should be read by the author; this would help to do away with the custom of some

authors of writing their papers on the way to the meeting. It is safe to say that the author who is so terribly pushed for time as to be compelled to call in the services of a stenographer and typewriter after he reaches the place of meeting, is not going to produce anything that will prevent the section from disintegrating into a trolley party, if such an opportunity occurs.

### A COMPARISON.

The editor of the *Pharmaceutical Journal* has expressed a fear that our remarks in the August number on the ability of the British Pharmaceutical Conference to transact a large amount of scientific work in a short time were sarcastic rather than complimentary, and we are desirous of assuring him that he may interpret in favor of the Conference. The assertion was made with a comparison in mind, which has been made during the past several years, while the two great English-speaking pharmaceutical bodies have been holding their annual meetings. The developments this year at Minnetonka still more emphasized the difference in the manner of conducting the two associations. At Glasgow the Conference lasted three days, the last of which was devoted to pleasure-seeking, and seventeen papers were read and discussed. The report in the *Pharmaceutical Journal* does not record that any were read by title; one, making eighteen in all, arrived from Australia too late for the meeting, but was accepted by the Publication Committee. At Minnetonka five days were set down for business, and two more, with Sunday, for pleasure; about thirty papers were disposed of, many of them being merely read by title, and discussion was much curtailed on the others. Certainly no sarcasm can be found in our remarks after making this comparison.

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## REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Sur un Strophanthus du Congo Française.—Par MM. les professeurs Schlagdenhauffen et Louis Planchon. Reprint from *Annales de L'Institute Colonial*, Marseilles. 1897.

The authors studied this new species because they believe that strophanthus will be an important medicine of the future, and because every new variety of such a valuable remedy, which appears in commerce, should have its fitness for medicinal use established. From the several botanical characters clearly shown in the beautiful illustration which accompanies the contribution, the authors feel justified in declaring this to be a new species, which they have designated Strophanthus d'Autran, after the botanist who collected it.

In Chapter I the fruit and seed are described, and the anatomic differences between this and other species illustrated. Chapter II is devoted to the chemical analysis of the fruit and seed; and Chapter III describes the physiological action of the several commercial species compared with the new species, and their influence on the heart action of a frog is illustrated.

The conclusions reached are that there is a close resemblance, chemically, between the new species and the Strophanthus hispidus, analyzed by Fraser, and that the physiological actions of S. Kombé, hispidus, glabre, Zambése and d'Autran are identical.

The whole is a creditable piece of research work, which, in view of the growing popularity of the drug, is worth the while of pharmacognosists to study.

ANNIVERSARY ADDRESS before the Royal Society of New South Wales, by the president, J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney, May 5, 1897.

This comprehensive pamphlet of sixty-nine pages is composed as follows: "History of the Society during the past year," "Progress of Science in New South Wales during the past year," "Some Botanical Matters," "Forestry, etc.," "Australian Timbers," "Botanical Teaching in New South Wales," "A Plea for a Botanical Survey."

Under botanical matters, a fitting allusion is made to the life work of the late Baron von Mueller. Every part of the address contains valuable information about Australia.

CONTRIBUTIONS FROM THE U. S. NATIONAL HERBARIUM, Vol. V, No. 3. STUDIES OF MEXICAN AND CENTRAL AMERICAN PLANTS. By J. N. Rose, Washington, 1897.

The similarity in the flora between the Southwestern United States and the regions covered in the above contribution makes this number of considerable interest. The illustrations are numerous and well executed.

AGE OF TREES AND TIME OF BLAZING DETERMINED BY ANNUAL RINGS. By B. E. Fernow, Chief of Division of Forestry. Circular No. 16, issued by the U. S. Department of Agriculture, Division of Forestry.

The author is a firm believer in the method of determining the age of trees by counting the annual rings; indeed, it is difficult to understand how there can be any controversy on the subject. Mr. Fernow, after a close study of the objections, has written a clear and concise account of how to overcome the difficulties. The part devoted to the covering of blazes, wounds and knots is also valuable. The circular is remarkably well illustrated.

CIDER VINEGARS OF PENNSYLVANIA. By Dr. William Frear, Bulletin No. 22, of the Pennsylvania Department of Agriculture.

While much of this report is especially of value to the farmer in determining the value and ripeness of his product, still the chemist, after reading it, cannot but be better prepared to identify a true cider.

SALICYLIC ACID AND CALCIUM SULPHITE AS PRESERVATIVES OF CIDER. By E. H. S. Bailey and Chas. M. Palmer. From the Kansas University Quarterly, Vol. VI, No. 3, 1897.

BULLETIN OF THE BUSSEY INSTITUTION, Jamaica Plain, Boston, Vol. II, Part VI, 1897.

This number is devoted to "Observations on Some of the Chemical Substances in the Trunks of Trees." By F. H. Storer, Professor of Agricultural Chemistry. It is of especial interest because of its record of the investigation of cellulose and closely allied bodies.

MEDICAL BOTANY. By William Trelease, Sc.D., Director of the Missouri Botanical Garden.

Coming from such a source, this contribution should be read with more than

ordinary interest by pharmacists and physicians. The author points out that the study of medical botany of to-day has fallen to the pharmacist to a larger extent than to the medical student; he, however, states that the growing knowledge of bacteria is a necessary branch of medical botany, and that the physician cannot ignore this subject. The paper was originally read before the Section on Materia Medica and Pharmacy of the American Medical Association, at the 1897 meeting, in Philadelphia.

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## NOTES AND NEWS.

*Professor Oscar Loew*, who has been professor of chemistry in the Agricultural Department of the Imperial University at Tokio, Japan, for the last four years, has returned to Germany and is again engaged in teaching in the University at Munich. His successor in Tokio is Dr. Bieler, formerly assistant in the Agricultural Laboratory at Halle.

The *Flückiger Medal* was awarded by the German Pharmaceutical Association, during its recent meeting, to E. M. Holmes, Curator of the Museums of the Pharmaceutical Society of Great Britain.

This medal is awarded once in five years, for distinguished services in the promotion of pharmaceutical research. In selecting Mr. Holmes as the subject of this honor, the society did credit to itself, and at the same time acknowledged the eminent worth of a man whose researches have been so numerous and productive of results that if the titles alone were given they would fill some pages of this JOURNAL.

*Citric acid by fermentation of carbohydrates* is claimed by German patent No. 72,957, April 5, 1893, and species of citromyces are especially mentioned as bringing about this fermentation. The patent is now supplemented by a new claim (German patent 91,891), based upon the discovery that the same result may be obtained by means of Mucor piriformis. The latter fungus is found on putrefying fruit, especially on pears and apples; its spore carriers only grow in a moist atmosphere, and form long, white filaments, terminated by brownish-black heads. It can readily be obtained in pure culture by sowing the spores in a suitable medium, such as sugar solution, beer wort, steamed rice, starch paste, etc., the ordinary room temperature being favorable for its growth. The solution becomes acid from the formation of citric acid.—*Jour. Soc. Chem. Industry*, June 30, 1897.

*The Bile of Serpents* is found by Professor Fraser to have the power of neutralizing serpent venom, whilst ox bile has the same property in a lesser degree. This neutralizing action is manifested to a wonderful degree when the bile is injected along with the venom, and to a less extent when it is injected after the venom. In a paper treating of this subject, read by the Professor before the Royal Society of Edinburgh, on Monday, July 5th, he stated that he had separated the water-soluble part of the bile from the alcohol-soluble part, and found it quite equal to the best antivenene in its immunizing effects with regard to serpent venom. These are very interesting results of the investigation upon which Professor Fraser has been engaged so long, and it is to be

hoped that they may prove capable of practical application.—*Pharm. Journal*, July 17, 1897.

*Ginseng* is one of Corea's most valued products, and during 1896 realized some £30,000. For centuries past red ginseng has gone to Pekin with the annual overland embassy, the trade in ginseng being a royal monopoly, from which the King of Corea derived a considerable portion of his revenue, and its export by sea was prohibited. In November, 1895, however, an ordinance was promulgated legalizing its export, the king receiving compensation by an addition to his privy purse, which now stands at some £60,000 a year. The annual crop of ginseng is limited in quantity to about 15,000 catties, upon which an excise duty of $10 a catty is charged under the new regulations, to which is added an import duty of 5 per cent. *ad valorem*, levied on its arrival at a treaty port in China. The prescribed scale of taxation is not rigidly adhered to, and there is reason to believe that in practice the amount raised exceeds considerably 15,000 catties.—*Pharm. Jour.*, August 7, 1897.

*A Monument to Pelletier and Caventou* has been proposed in Paris, and the following committee has been appointed:

Honorary President, M. A. Chatin.
President, M. Planchon.
Vice-Presidents, MM. Moissan and Marty.
General Secretary, M. Bêhal.
Assistant Secretary, M. de Mazières.
Treasurer, M. Bocquillon-Limousin.

The committee feels justified in calling on all those who have been benefited by the discovery of Pelletier and Caventou. These scientists gave to the world, unencumbered by trade-mark, patent or any other reservation, one of the greatest of remedies—quinine. It is proposed to erect the monument in front of the École de Pharmacie de Paris. The address of the Treasurer is 2 bis, Rue Blanche, Paris.

The thirteenth annual meeting of the *Minnesota State Pharmaceutical Association* met at Lake Park Hotel, Lake Minnetonka, August 23d and 24th, with thirty-five members in attendance at the opening session, and nearly 100 were in attendance before the meeting closed.

Secretary C. T. Heller, reported 286 members on the roll; lost by death, 5. Treasurer H. W. Rietzke reported a balance of $160. Twenty-five new members were elected at the first day's meeting, and five at an adjourned meeting held August 28th.

The following officers were elected for the ensuing year: President, Fred. Scott, Stillwater; First Vice-President, H. T. Holverson, Alexandria; Second Vice-President, F. W. Finch, Hastings; Third Vice-President, Miss Josie A. Wanous, Minneapolis; Secretary, Charles T. Heller, St. Paul; Treasurer, H. W. Rietzke, St. Paul; Executive Committee, John F. Danek, Minneapolis; A. T. Hall, St. Paul, and A. J. Eckstein, New Ulm.

Committee on National Legislation offered the following resolution, which was unanimously adopted:

WHEREAS, it is customary for the Government to grant a trade-mark or copyright to manufacturers of articles made in foreign countries where said articles are not protected by trade-mark or copyright, thus restricting competition in the manufacture of said articles in this country. Therefore, be it

*Resolved*, That the members of the Minnesota State Pharmaceutical Association, in convention assembled at Lake Park, August 23d, do earnestly urge the Committee on National Legislation of the A. Ph. A. to see that a bill is drafted and presented to Congress prohibiting the future granting of such copyright or trade-mark for goods manufactured in foreign countries, and not thus protected in the countries where made, and thereby remove the excessive cost on such goods in this country, whereas as the law now stands an alien can introduce articles into this country for four or five times the price in his own country, while our Government hardly receives a cent of revenue.

A committee of three was appointed to formulate a price-mark to be used in marking copies of prescriptions, so that there will be more uniformity of prices throughout the State on prescriptions, the Secretary to be the custodian of the mark, and to be given only to those who will agree to use it.

Meeting adjourned to meet at Lake Minnetonka, June 14, 1898.

## OBITUARY.

Professor Dr. Victor Meyer, whose brilliant discoveries in the field of chemical research won for him the esteem and admiration of his fellow-laborers in this branch of science, died unexpectedly at his home in Heidelberg, Germany, August 7th.

He had been suffering from nervous troubles, accompanied by insomnia, brought on, no doubt, by excessive work, and it is sad to reflect that a man of such energy and ability as Professor Meyer should, perhaps, during a temporary aberration of mind, end his own career, as was evidenced by the circumstances connected with his death.

Professor Meyer was born at Berlin, September 8, 1848. He entered the university there in his sixteenth year, but remained only a short time, when he went to Heidelberg, where he devoted himself to the study of chemistry under Bunsen. After graduation at the latter institution he continued his study of chemistry under Baeyer, at Berlin. In 1867 he became assistant to Bunsen, and in 1871 was made professor of chemistry at the Polytechnic School at Stuttgart, and in 1872 at the Polytechnic School at Zürich. In 1855 he removed to Göttingen, and in 1889 was appointed successor to Bunsen at Heidelberg, the latter recommending him for the position. As an instructor he was singularly gifted, and the study of chemistry at Heidelberg received a great impetus through his teachings.

His scientific papers were numerous and covered a wide range of subjects in the domain of chemistry, and it is only necessary to refer to a few of the results accomplished by him to show the importance of his work. Of particular significance was his study on the subject of vapor density; for not only did he devise a method for determining vapor density, which has largely supplanted other methods, but the principles of pyro-chemistry were more thoroughly and clearly established by the results obtained by him at high temperatures. By his discovery of thiophene in benzine, and the subsequent study of its properties and derivatives, he added to organic chemistry an entirely new series of compounds.

In 1893 Professor Meyer was elected an honorary member of the Philadelphia College of Pharmacy.

THE AMERICAN
JOURNAL OF PHARMACY.

*NOVEMBER, 1897.*

# INTERNATIONAL CONGRESSES.

By Prof. Joseph P. Remington, Philadelphia.

A great deal of misconception evidently exists in the minds of many upon the objects and aims of international congresses of various kinds.

This is not only the case in relation to pharmaceutical conferences, but medical and professional international gatherings of all kinds. The absence of a universal language must always continue to be the principal bar to effective intercourse between representatives of mixed nationalities, and the larger the attendance at a congress the greater becomes the babel of tongues, with its necessary confusion. The International Medical Congress at Moscow had an immense attendance, a very large number of papers were read of unequal value and although the Russian Government provided most liberally for the entertainment of the delegates, it was found impossible to send invitations to each member for every official function. This necessarily produced heart burnings which even Russian diplomacy could not entirely soothe.

The International Pharmaceutical Congress, which met at Brussels, has been criticised by a German editor in America, who found fault with it, for "from the beginning to the end not a German word was heard in the deliberations of the Congress," and "because the subjects on the programme were principally of interest to Belgium, and almost exclusively presented from the Belgium standpoint," and the writer consequently argues "that it could not be international

in character." Thus we have two contrasts presented. One congress was too international and suffered from unwieldiness, and the confusion incident upon the attendance of too many foreigners, and the other could not be international because no German voice was heard in its deliberations, and too much local flavoring was injected into its composition.

It will always be a question for many generations to come, whether the world would be likely to flourish better under one supreme mundane ruler or a number of rulers governing as many separate nations. The German nation itself is wrestling with this problem, and many of its best citizens are asking: "Are we better off to-day under the Empire than we were before consolidation was effected?" and this condition exists notwithstanding the fact that the same language is spoken by all. Is it strange, then, that an international gathering largely attended by men of one profession like the one at Moscow should be criticised by some of its own members, who have been heard to say: "I have derived more benefit from my own County Medical Society than from the deliberations of the great Congress which I have travelled 7,000 miles to attend?" The truth is, that international congresses must not be judged from a local standpoint. The ideal congress, either pharmaceutical or medical, would probably be one in which all civilized nations were equally represented and equal prominence given to each, papers read and discussed only by the most distinguished representatives from each nation, and each one bristling with original observations or newly discovered facts, while the decision of the congress upon general questions should be such as would deal fairly and justly with every nation, and accepted as final by the subordinate bodies in each country. Finally, every member should return home, perfectly satisfied that he had received every attention due him as the representative of his nation, and the action which he especially desired the congress to take was adopted, and what he did not want adopted was rejected. No one can ever hope to see such an ideal realized.

Unfortunately, those who desire to accomplish any good, no matter how high their ideal may be, must be prepared to accept the conditions *which exist*, and strive earnestly to bring about the ideal. If a congress is not international the cause should be sought for and removed if possible. In professional gatherings, political differences should be ignored; "Science knows no language and no country."

The earnest seeker for truth is rewarded by making a discovery which will rescue many a valuable life or alleviate suffering wherever it exists; a liberal profession should embrace in its membership those who are willing to labor for the benefit of all, and until such a motive actuates the members of the pharmaceutical profession throughout the world, and unless the true international feeling is cultivated, the ideal can never be approached. If rejoicing is in order and congratulations tendered, because the representatives of a great nation *decline the invitation to attend a congress*, then is the first principle sacrificed. Some one spot in the world must always be selected as the place of meeting, and long distances travelled by some delegates, of course, loyalty to the international spirit should overcome personal feeling, and if members have grievances, nothing can be gained by staying away from the meeting; there is really more necessity for activity and personal interest. It is deplorable that international pharmacy, standing as it does to-day, more in need than any other profession, of united effort, seems to possess a greater proportion of iconoclasts and pessimists than any other; this is especially the case in America; if an organization for mutual benefit is started, more hands seem to be at once raised to tear it to pieces, than to build it up. Will it be thus always?

International congresses, in the writer's opinion, serve a most valuable purpose in bringing together pharmacists of different nations; notwithstanding the difficulties of interchanging thought fluently, it is worth something to realize that progress in education, in scientific research and social advancement is constantly going forward, and if abuses and obstacles are found in one's own country, it is some consolation to hear (even in a foreign tongue), that efforts are made to reform the abuses and to overcome the obstacles, and "the fellow-feeling that makes one wondrous kind" is kindled. In all international and national gatherings, whether professional or otherwise, the social features are claiming more attention and recognition. It is true that there are many scientists who stand aloof from social entertainment of all kinds, others rail at them in public and private, but nevertheless are seen always at these entertainments. It may be assumed, however, that without social functions, congresses would be very poorly attended. The pharmacist, overworked, confined during the day and often a large part of the night within the walls of his dingy shop or laboratory, looks forward to a

vacation in the heated term for a relief; if he can combine mental and physical recreation by associating with his fellows and kindred spirits, and thus gaining by social intercourse and rational pursuits the much needed rest, he has enlarged his horoscope and becomes much better qualified to deal with the perplexing problems which threaten his existence, and has taken the preliminary steps toward that organization and united effort which will make him a power in the community, instead of a disorganized mass of disjointed entities.

Eight International Pharmaceutical Congresses have come and gone, and while it can be truly said that not one has reached the ideal, it must be remembered that great difficulties have stood in the way. Some of these have already been noted. Such gatherings suffer greatly from the impossibility of organizing them completely until the first day of the meeting, for it can never be told in advance with certainty how many foreign delegates can be present. Necessary delays in travel and many other contingencies prevent the local committees from arranging satisfactory programmes for each day. There is a difficulty of finding, even in a large city, competent interpreters who have a knowledge of the technical subjects discussed; then again, no one person has ever been found who has a complete knowledge of the abilities and capacities of each delegate, and hence it must follow that committees are not always appointed which embrace the best available material; in short, all of the responsible organizing authorities are reduced to the necessity of selecting those whom they know and whom they believe to possess the necessary qualifications. Hence it will always be found that each pharmaceutical congress must suffer from what is called "local flavoring." In conclusion, the writer does not share in the belief that international gatherings should be discontinued. The faults are capable, in a large measure, of being corrected or minimized when they are fully recognized, and greater experience will lead to their elimination, but one valuable consideration stands out prominently which overshadows the minor faults. Pharmacy is recognized officially by European Governments as a profession, and, as in the case of pharmacy laws which are admittedly imperfect, it must be said that the steady advancement in the recognition by the people of the important relations which the pharmacist sustains toward them is one of the greatest value. Is it not possible we have had too much criticism of the detail in judging such gatherings, and too little real appreciation accorded to the greater results accomplished?

# THE DESTRUCTION OF TOBACCO IN VIRGINIA BY ACT OF GENERAL ASSEMBLY, JANUARY 6, 1639, UNDER SIR FRANCIS WYATT, GOVERNOR.[1]

BY JOHN URI LLOYD, PH.M., PH.D.

*Query by Professor Flückiger.*—"In Alonzo Calkins (Opium and the Opium Appetite), Philadelphia, 1871, p. 373, there is a statement to the effect that in 1639, by authority of the 'Virginia Assembly' there went out a decree that all the tobacco then standing in cultivated fields should be dug up and exterminated. Is this correctly abstracted from some official records?"

*Answer by John Uri Lloyd.*—In reply to this question, I am convinced that the evidence is conclusive that only *part* of the tobacco was destroyed. This was because tobacco was too abundant to command a good price in the market, and *not* with a view to its extermination. By destroying a large share of the crop the remainder was enhanced in value. In support of my view, I offer testimony which seems to me conclusive.

The subject may be traced as follows:

*G. Bancroft* makes only general allusion to the laws restricting the planting of tobacco in Virginia at that time.

*Robert R. Howison*, A History of Virginia, 2 Vols., and

*Henry Howe*, Historical Collection of Virginia, 1856, both point to:

*Hening, Statutes at Large*, 1st Vol., pp. 224 and 225, as a book of reference on the records of Virginia administration. In this publication, *1st Vol., pp. 224 and 225*, we find the following Acts by the Grand Assembly of Virginia, January 6, 1639, under Sir Francis Wyatt, Governor:

ACT I.

"Tobacco, by reason of excessive quantities being made, being so low that the planters could not subsist by it, or be enabled to raise more staple commodities, or pay their debts:

[1] When Professor Flückiger visited America (July, 1894) he hoped to obtain historical data that would enable him to give the records of several interesting American productions. In this he failed, and he then associated in his behalf the services of the author of this paper. After much of the work had been done, the death of Professor Flückiger interrupted the investigation. This paper on tobacco was one of the subjects considered.—EDITOR AM. JOUR. PHARM.

"*Enacted*, that the tobacco of that year be viewed by sworn viewers, and the rotten and unmerchantable and *half the good* to be burned."

"So the whole quantity made would come to 1,500,000 pounds without stripping and smoothing, and the next two years 170 pounds tobacco per poll, stripped and smoothed, was to be made, which would make, on the whole, about 1,300,000 pounds, and all creditors were to take 40 pounds for 100."

ACT II.

"No man should be obliged to perform above half his covenants about freighting tobacco in 1639."

Adjoined to the copy of these Acts we find the following, added by Hening, to show his authority:

"These acts are printed from a MS. which belonged to Thomas Jefferson, President of the United States, and which is now in the *Library of Congress at Washington.*

"This MS. volume is lettered '*Writings Related to Virginia*,' and contains most of the old charters, instructions to the governors, etc. At the end of the volume is an abstract of public papers, taken from the rolls, the number and page of which are referred to, but without regard to chronological order. The Acts of 1639 appear to be a mere *abridgement*, and, from the handwriting and orthography, it seems to have been made long posterior to their date.

"This abstract concludes with a list of the governors of Virginia down to the year 1722, at which time, or shortly afterwards, it was probably compiled.

"The handwriting, on comparison, appears to be that of 'R. Hickmann,' by whom, as 'clerk of the secretary's office,' several public papers are attested."

In connection with the foregoing, as an evidence that "history repeats itself," we find that the president of the Cotton Growers' Association has recently (1897) advocated the destruction of part of the cotton crop of the South, in order to increase the price of that which remains. A paper headed "Signs of the Times," in the *Nation*, March 4, 1897, prints the following, thus showing that the method adopted 250 years ago has met the theorist of to-day:

"*Signs of the Times.*—The Southern farmers are again showing that it is not the principle of combination to which they are opposed, but the use of that principle by any other class of people than farmers

—except ' organized labor.' They denounce bitterly any union on the part of those who buy their cotton to raise the price of products manufactured from it, but they earnestly advocate the adoption of measures to make the manufacturers pay higher prices for the staple. The president of the Cotton Growers' Association has issued an address calling conventions of the Texas farmers at Waco, Texas, March 8th; of those in the Mississippi Valley at Memphis, March 10th, and of those east of the Mississippi at Augusta, March 15th, to secure ' concert of action,' as ' by a systematic and judicious marketing of our crops we can realize inestimable benefits that never can be secured permanently otherwise.' The method urged upon the cotton growers is that which is so bitterly complained of when applied to the cotton manufacturers—a restriction of the output in order to secure higher prices. ' Destroy the annual surplus of cotton ' is the watchword. ' You will be better off with a 7,000,000-bale crop selling at 10 cents, supplemented by ample food crops, than with a 10,000,000-bale crop selling at 5 cents.' "

## AN EXAMINATION OF SOME OFFICIAL LEAD PREPARATIONS.

By Frederick W. Haussmann.

Sub-Committee of Research of the United States Pharmacopœial Committee of Revision.

The observation that certain official preparations prepared from lead salts differed from the standard prescribed by the Pharmacopœia, induced the writer to inquire into the cause of such variations.

Continued investigations revealed the fact that the statements of the Pharmacopœia, regarding the preparations under examination, were also open to criticism, and in the course of this paper, alterations and additions which may be regarded necessary will be mentioned.

The experience of other pharmacists is invited to be rendered for comparison either to corroborate or disprove the conclusions arrived at by the writer.

The original researches were confined to Goulard's extract, the liquor plumbi subacetatis of the Pharmacopœia, where the first deviations from the official standard were noticed. It was soon found, however, that, to determine the exact causes thereof, it was also necessary to examine the metallic ingredients, lead acetate and oxide.

LIQUOR PLUMBI SUBACETATIS.

If it were possible to realize the idea of an international Pharmacopœia, this preparation deserves attention among the first to secure uniformity in method of preparation as well as in the proportion of basic salt.

It is unnecessary to point out the respective variations in different pharmacopœias, and only sufficient to call attention to varying degrees of specific gravity, volumetric strength and method of preparation.

Even in the Pharmacopœia of the United States the two last revisions have been productive of deviation in strength from the previous editions.

The subject of Goulard's extract may be treated under the following heads, viz.: preparation, specific gravity and volumetric strength.

PREPARATION.

The following are the full pharmacopœial directions:

| | Grammes. |
|---|---|
| Lead acetate | 170 |
| Lead oxide | 100 |
| Distilled water to make | 1,000 |

Dissolve the lead acetate in 800 grammes of boiling distilled water, in a glass or porcelain vessel. Then add the lead oxide, previously passed through a fine sieve, and boil for half an hour, occasionally adding hot distilled water to make up the loss by evaporation. Remove the heat, allow the liquid to cool and add enough distilled water, previously boiled and cooled, to make the product weigh 1,000 grammes.

Finally filter the liquid in a closely covered funnel.

In these directions the amount of insoluble basic lead subacetate is included in the final weight, and the solution is directed to be filtered therefrom.

The filtrate weighs, according to the National Dispensatory, approximately 950 grammes.

An inquiry among a number of pharmacists revealed that the pharmacopœial directions are interpreted by several to read to make the *filtrate* weigh 1,000 grammes. This would result in a preparation approximately 5 per cent. weaker in strength.

The basis for this opinion is furnished by the official direction of boiling the oxide in 800 grammes of distilled water, in which the

acetate has previously been dissolved, and *making up* the loss by evaporation by the occasional addition of hot distilled water.

The exact observation of the original volume in this manner, it is claimed, would necessarily produce an aggregate weight of 1,070 grammes. To substantiate this claim, the specific gravity of the solution thus prepared is advanced, which closely approximates that stated by the Pharmacopœia.

Determinations by the writer in instances where cold maceration was employed, with the stated increase in the amount of the water, again where the pharmacopœial method of preparation under like conditions was followed, and finally in another process, to be described subsequently, it was found that the specific gravity remained within pharmacopœial bounds, although a less quantity of $\frac{n}{1}$ sulphuric acid was required for the complete precipitation of 13·67 grammes of the solution.

Goulard's extract may also be prepared by cold maceration, viz.: by introducing the lead salts in a bottle with the water, with occasional agitation, until the yellow color of the oxide is changed to white.

This is the process of the Austrian Pharmacopœia, and two to three days are stated to be required for completion. Positive assertion is made that with the disappearance of the yellow color of the oxide no more enters into solution. The chief objection to this method is the time it requires.

While preparing the solution by cold maceration, it occurred to the writer to try if the substitution of hot or even boiling for the cold water would accelerate the solution of the oxide.

This was determined to be the case, and it was found possible to prepare Goulard's extract in a comparatively short time, avoiding the troublesome boiling and the difficulty experienced in the preservation of a definite volume.

The following are the directions:

A strong bottle—a fruit juice bottle holding a full quart will answer—is graduated to 730 c.c.

Distilled water is heated to boiling and poured into the bottle up to the graduation mark.

170 grammes of selected *crystallized* lead acetate, previously broken into small pieces, are now quickly added and the bottle corked.

A few turns of the vessel will dissolve the salt.

100 grammes of lead oxide, previously sifted, are now added in divided portions, thoroughly shaking the bottle after each addition.

In from five to ten minutes, on repeated thorough agitation, the yellow color of the oxide will have changed to white.

The mixture is allowed to stand two hours or until cold, with occasional agitation, and filtered, with observation of the usual precautions.

The solution thus prepared will fulfil the requirements of the Pharmacopœia in all particulars.

The only precautions necessary are the observation of the liability of fracture of the bottle, unless the same is previously warmed, and the protection of the hands with gloves or a towel to prevent burning.

The oxide must be added in divided portions, as the full addition is liable to be followed by caking, with consequent less rapid solution.

The question may be raised—will this comparatively brief contact of the lead salts suffice to complete the solution, or, by further prolonged maceration, will more of the oxide be not taken up?

To determine this point, the following trial was made: The process described was employed, preparing 1,000 grammes of the solution.

After a contact of exactly two hours 100 c.c. of the solution were filtered off and marked filtrate No. 1.

The remainder of the solution was allowed to stand twenty-four hours longer, with occasional agitation.

An additional 100 c.c. were again filtered and marked No. 2.

The remaining portion was allowed to stand forty eight hours more, and a third portion of 100 c.c., marked No. 3, filtered off.

The final remaining mixture was allowed to stand eight days, with occasional agitation, making the total time of maceration from the time of preparation about twelve days, and filtered.

The solutions were each examined in turn as to specific gravity and percentage of basic salt, according to pharmacopœial directions.

The respective specific gravities were all found to be identical, and the estimation with normal sulphuric acid gave little variation, in no case being more than a fraction of a cubic centimetre, and none

were found to require less than 25 c.c. for precipitation of 13·67 grammes of the solution.

Similar experiments were repeatedly performed, and it was invariably found that after a contact of two hours, little or no oxide passes into solution.

In one instance, the mixture of lead, salts and water was allowed to stand three weeks before filtration, but no difference was found between this and a filtrate of two hours' standing.

Various modifications of this process, such as trituration of the mixed lead salts in a mortar and subsequently adding boiling distilled water, were also tried, but furnished no improvement over the method described.

OTHER METHODS OF PREPARATION.

Acetates of the alkaline earth metals also possess the power of dissolving lead oxide.

Of these, magnesium acetate has been suggested to prepare a modification of Goulard's extract, and particularly lead water.

This process, as given in the Proceedings of the American Pharmaceutical Association of 1893, possesses no advantage. It is tedious and does not furnish an official preparation.

Of greater importance is a process which is based on the fact that if ammonia water is added to a solution of lead acetate in the proper proportion, a solution of the basic salt is immediately produced.

The following is the process recommended:

Seventy-five parts of pure crystallized lead acetate are dissolved in 165 parts of distilled water and 11 parts of water of ammonia, 20° B., sp. gr. 0·923, are added.

In place of the ammonia water of this strength, 22 parts of the official 10 per cent. water can be added, deducting 11 parts from the amount of water employed to dissolve the acetate. The preparation is stated to be immediately ready for use.

Goulard's extract, thus prepared, resembles the official preparation in appearance, has no odor of ammonia, but in point of stability possesses no advantage, also depositing lead carbonate on prolonged standing.

The specific gravity of the solution was found to be 1·208.

In the volumetric estimation of Goulard's extract, prepared by

the ammonia process, several conditions were noted, which, when disregarded, are liable to lead to error.

Titrated with $\frac{n}{1}$ sulphuric acid, using methyl-orange as indicator, it was found that nearly 30 c.c. were required before the orange color was changed to crimson, while in precipitation without the indicator, only 22 to 23 c.c. were required for 13·67 grammes of the solution.

Both estimations were found erroneous, the ammonia probably influencing the reaction with the indicator, while in the simple acid estimation the fact must be considered that ammonium acetate, which necessarily is present in the preparation, has the property of dissolving lead sulphate.

If the lead is completely precipitated by means of sulphuric acid, the sulphate removed by filtration and the filtrate examined, the presence of the metal is revealed by every reagent, excepting sulphuric acid.

To accurately estimate an ammonia-prepared Goulard's extract by means of volumetric analysis, it is therefore necessary to employ a different precipitant.

Volumetric $\frac{n}{1}$-oxalic acid solution was substituted for sulphuric acid, and it was found that 13·67 grammes of the preparation required 23 to 24 c.c. for complete precipitation.

### COMMERCIAL GOULARD'S EXTRACT.

A number of specimens of Goulard's extract, procured from various sources, were also examined as to their specific gravity and volumetric strength.

In appearance, considerable difference was noticed, some being clear and perfectly colorless, while one sample was of a decidedly yellowish-brown color.

All degrees of intensity in precipitation of lead carbonate were also observed.

The liability of the preparation to deposit the carbonate on standing must be considered when comparing commercial samples with the pharmacopœial standard.

This takes place even when every precaution is employed to prevent the access of air.

As a necessary consequence, decrease both in specific gravity and volumetric strength will result.

This was noticed by Prof. J. U. Lloyd in a paper published in the AMERICAN JOURNAL OF PHARMACY, and in a number of observations the writer can only record a similar experience.

SPECIFIC GRAVITY OF GOULARD'S EXTRACT.

The specific gravity of commercial Goulard's extract varies widely.

One sample, which was stated to be of recent preparation, had a specific gravity of 1·270, and 13·67 grammes required between 29 and 30 c.c. of $\frac{n}{1}$ sulphuric acid for precipitation.

This specimen was evidently prepared according to the Pharmacopœia of 1870.

On the other hand, one solution was found of the specific gravity of 1·128, which required only 15 c.c. of the normal acid for the precipitation of 13·67 grammes.

This preparation was cloudy, and bore evidence of careless preservation.

The present Pharmacopœia states the specific gravity to be *about* 1·195, while the edition of 1880 requests the same to be 1·228.

The latter employs a larger quantity of lead oxide, but both are unanimous in the amount of basic salt, each demanding 25 per cent.

A number of determinations have led the writer to the conclusion that the specific gravity point of the present Pharmacopœia is placed too low.

This was first suggested while examining a commercial specimen, which possessed the specific gravity of 1·1875, but only required 20 c.c. of normal sulphuric acid for precipitation of 13 67 grammes.

Several samples, with specific gravities closely approximating the official figure, were invariably found to require less than 25 c.c. of the normal acid for precipitation.

It was also found that considerable variation in specific gravity took place if lead acetate was employed obtained from different sources.

It was, in fact, found impossible to purchase this salt in the mar-

ket, to employ it with any degree of confidence for the accurate determination of the specific gravity of Goulard's extract.

The results of the writer, pertaining to the quality of commercial lead acetate, will be treated of subsequently.

At the suggestion of Prof. H. Trimble, the writer prepared lead acetate from a sample of litharge, which assayed 99 per cent. of lead oxide, crystallizing the salt from a slightly acid solution.

The air-dried salt was obtained in silky masses, considerably more bulky than the commercial salt.

Goulard's extract was prepared from this salt.

For the accurate determination of the specific gravity maceration was first employed, each step in the process being carefully checked and every precaution observed.

About 1 litre of distilled water was heated to boiling, and, while hot, poured into a previously sterilized bottle and allowed to cool.

730 c.c. of the water were measured out and, to determine the exact quantity, weighed.

To further prove, the amount was calculated to troy weight, and compared.

170 grammes of the acetate were dissolved in the water, and to this solution 100 grammes of the 99 per cent. lead oxide were added in divided portions.

The mixture was allowed to stand in a well-closed bottle for five days, agitating repeatedly, at the expiration of which time the mixture was again weighed and no loss noticed.

It was then filtered with the usual precautions.

The specific gravity of the finished solution was found to be 1·230, and 13·67 grammes required between 25 and 26 c.c. of $\frac{n}{1}$ $H_2SO_4$ for complete precipitation, using methyl-orange as indicator.

To verify the above result the solution was prepared by the pharmacopœial process, with scrupulous observation of all details, employing the same salts as in the foregoing operation.

The specific gravity of this solution was 1·229, and 13·67 grammes also required between 25 and 26 c.c. of the normal acid for precipitation, thus obtaining almost identical results.

Various similar experiments were also made with acetates and oxides of lower percentage than employed in the foregoing. The results thus obtained were deemed of importance, as the lead acetate

of commerce is usually prepared from litharge more or less impure, and this may influence the specific gravity of lead subacetate solution prepared from such salts.

For instance, the solution was made from an acetate which the writer prepared from a sample of litharge assaying 96 5 per cent. of oxide, the latter being also employed.

The finished preparation had the specific gravity of 1·225, and required exactly 25 c.c. of normal sulphuric acid for the precipitation of 13·67 grammes.

The specific gravity of lead subacetate solution will not answer either for an identity test or a criterion as to percentage strength.

An aqueous solution of lead acetate containing between 25 and 28 per cent. of the salt will have a specific gravity closely approximating 1·195, the official figure for Goulard's extract.

A 17 per cent. solution of lead acetate was found to have the specific gravity of 1·123, and 13·67 grammes required for precipitation about 14 c.c. of $\frac{n}{1}$ $H_2SO_4$.

An addition of 100 grammes of lead oxide to 1,000 grammes of this solution, allowed to stand one week with occasional agitation, yielded a filtrate of the specific gravity 1·207, which, however, only required 23 c.c. $\frac{n}{1}$ $H_2SO_4$ for precipitating the usual amount.

It will be seen that although the specific gravity of this solution is in excess of the pharmacopœial figure, it fell short in the percentage of basic salt, while having a 10 per cent. increase in water over the official amount.

From the above and other results obtained, the writer draws the conclusion that the specific gravity of liquor plumbi subacetatis must be placed as *about* 1·225, instead of 1·195, the pharmacopœial figure.

### LIQUOR PLUMBI SUBACETATIS DILUTUS.

The official lead water is one of the preparations for which, due to its liability to chemical change, it is alike impossible to suggest improvement or to fix a definite standard.

When recently prepared, a clear solution is obtained. But aside from the procedure of many pharmacists to draw their distilled water

for this preparation from the water spigot, it still remains that the solution cannot be kept long in a cloudless condition.

Many prefer to dispense a cloudy solution, to lessen the liability of error in connection with lime water.

In the Aqua plumbi Goulardi, a spiritous form of lead water of several continental pharmacopœias, ordinary soft water is directed.

An important feature is thereby lost sight of, namely the impairment of the efficacy of the preparation as a local application, the insoluble lead sulphate and carbonate not possessing an equal value.

For the Pharmacopœia to direct recent preparation is also impracticable and would be disregarded.

The writer attempted to estimate the percentage of basic lead subacetate in samples of lead water procured from the shops, but, due to the constantly decreasing strength of the official preparation, found it impracticable to fix a definite standard.

It was found, however, that commercial lead water presents even greater variations in strength than Goulard's extract.

In view of the liability of confounding the solution with liquor calcis, it is perhaps not out of place to call attention to the direction of the French codex to add a small quantity of vulnerary spirit, an alcoholic solution of the oils of lavender, sage and rosemary.

In connection with the official lead solutions, the writer would finally call attention to a preparation recently published in Dieterich's Manual, namely, a dried lead subacetate, plumbum aceticum siccum. As the quantities of the ingredients are based upon the German Pharmacopœia, it is unnecessary to reproduce them here.

From this dried salt, both Goulard's extract and lead water may be made extemporaneously, and as its preparation presents no difficulty to the practical pharmacist, a similar compound, based on U.S.P. quantities can easily be furnished.

The salt would solve a problem which, as long as the solutions are official, will always confront the pharmacist, namely, rapid and recent preparation.

## THE LEAD ACETATE OF COMMERCE.

By far the greatest importance, and of paramount influence upon Goulard's extract and similar preparations, is found in the quality of the lead salts.

First attention is claimed by the acetate.

Every pharmacist has undoubtedly observed the physical and chemical variations in commercial sugar of lead. In the price lists of wholesale drug firms we find quoted several varieties, among which we find the white and brown. That the latter has been used in making Goulard's extract in some instances was revealed by the examination of commercial samples.

But not only careless selection of the salt, but the inherent physical properties, as well as the liability of chemical change, have a material influence, and may either increase or diminish the strength of the preparations made therefrom.

Treating first of the liability of increase, we find that lead acetate contains 14·25 per cent. of water of crystallization.

The Pharmacopœia states that this is lost at a temperature of 40°C., and Ladenburg states that the salt loses its water of crystallization in dry air.

As in our climate the summer temperature falls but a few degrees short of the above figure, the liability of the loss of water must be borne in mind.

This will result in an *increase* in the lead strength of a salt thus exposed, and is, in not a few instances, in consequence, the result of keeping the salt in packages in place of well-closed vessels.

To substantiate this point, the writer made the following observation:

Goulard's extract was prepared from a specimen of lead acetate obtained from a reputable manufacturer and labelled C.P., U S.P., put up in paper cartoons.

The solution had the specific gravity of 1·253, and 13·67 grammes required 27 c.c. $\frac{n}{1}$ $H_2SO_4$ for precipitation.

But the prolonged exposure of the salt to air is, on the other hand, liable to cause a *decrease* in the lead strength.

Lead acetate absorbs $CO_2$ from the atmosphere, giving the salt a white crust of carbonate.

Prolonged exposure results in partial conversion into lead carbonate, and as the latter is insoluble in water, a deficiency in the lead strength of the salt takes place.

This is probably the cause of the diminished strength of commercial Goulard's extract, and is the result of the not unusual procedure of using the effloresced, unsalable scraps and refuse of packages in the sugar of lead drawer.

To obtain a satisfactory lead subacetate solution, it is, therefore, necessary to employ only crystallized lead acetate, free from efflorescence or carbonate, in its preparation.

The writer has examined fifteen samples of lead acetate, purchased in open market, with avoidance of duplication of source.

In the course of these examinations the advisability of introducing some means of estimating the lead strength of the salt, either gravimetrical or volumetric, became apparent, and a consideration of the subject may be urged upon the Committee of Revision of the Pharmacopœia.

The British Pharmacopœia has given directions for the volumetric estimation of the salt by means of sulphuric acid.

In an examination of fifteen samples of lead acetate, the writer found calcium in every specimen in varying amounts.

As the presence of this impurity may interfere slightly with an accurate estimation by means of normal sulphuric acid, decinormal potassium bichromate solution was employed as precipitant, and the number of c.c. necessary to precipitate 1 gramme of the salt determined.

This precipitant was suggested by the method of F. Lux in the valuation of red lead.

This author directs the decinormal solution to contain 14·761 grammes to 1 litre, each c.c. being equivalent to ·0207 gramme of lead.

If the decinormal solution of the U. S. Pharmacopœia, containing 14·689 grammes to the litre, be employed, each c.c. is approximately equivalent to ·02064 of lead, and consequently ·0378 of lead acetate.

Before, however, giving directions for a volumetric estimation, a standard of purity for the acetate must be fixed.

If allowance is made for impurities amounting to 2 per cent., we have the following calculation: $\frac{\cdot 98}{\cdot 0378} = 25\cdot 9$ c.c.

Nitrate of silver is used as an indicator to determine the end of the reaction, and as a slight excess of the bichromate solution is necessary for the development of the red silver chromate, it may safely be made 26 c.c.

The following addition may, therefore, be recommended to the Pharmacopœia:

One gramme of lead acetate, dissolved in 15 c.c. of water and acidulated with acetic acid, should require at least 26 c.c. of decinormal potassium bichromate solution for complete precipitation (presence of 98 per cent. absolute lead acetate).

Special directions for determining the end of the reaction by means of silver nitrate may also be added.

A number of commercial samples of lead acetate were examined in the following manner:

4 grammes of the salt were dissolved in sufficient recently-boiled distilled water to measure 40 c.c.

The degrees of opalescence of the solutions were noted.

10 c.c. of the solution were acidulated with acetic acid and estimated by means of the bichromate solution.

10 c.c. more were *filtered* and also precipitated in the same manner.

This procedure was employed with the object of determining the difference between the acetate as found and the actual amount of *soluble* acetate in the sample.

EXAMINATION OF COMMERCIAL LEAD ACETATE.

| | Appearance. | Appearan'e of Sol. in $H_2O$ | Precipita'n with Pot. Ferrocyanide. | $\frac{n}{10}$ $K_2Cr_2O_7$ Titrate of Acidulated Unfiltered Sol. | Titration of Filtered Sol. | Treatment with $NH_4OH$ after Pptg. with $H_2SO_4$. | Fe. | Ca. |
|---|---|---|---|---|---|---|---|---|
| 1 | Granular marked C. P. | Very opalescent | Pure white | 26·8 | 26·5 | Flocculent reddish | Present | Present |
| 2 | do | do | do | 28·6 | 27·3 | do | do | do |
| 3 | Granular | do | do | 26·9 | 26·5 | do | do | do |
| 4 | Crystals | Slightly opalescent | do | 27·9 | 27·2 | do | do | do |
| 5 | do | do | do | 27·8 | 27·3 | do | do | do |
| 6 | do | Somewhat opalescent | do | 25·9 | 26·7 | do | do | do |
| 7 | do | Slightly opalescent | do | 27·0 | 26·5 | do | do | do |
| 8 | Mixture of powd. and crystals | Opalescent | do | 26·3 | 26·0 | do | do | do |
| 9 | Mixture of opalescent and cryst'ls | do | do | 26·8 | 26·5 | do | do | do |
| 10 | Opalescent pieces | do | do | 28·0 | 27·2 | do | do | do |
| 11 | do | do | do | 26·7 | 26·4 | do | do | do |
| 12 | Marked C. P. U. S. P. much efflor. | do | do | 29·7 | 29·2 | do | do | do |
| 13 | Crystals | do | do | 28·1 | 27·7 | do | do | do |
| 14 | Mixture of powd. and crystals | do | do | 27·9 | 27·1 | do | do | do |
| 15 | Crystals | Slightly opalescent | do | 27·1 | 26·7 | do | do | do |

In the table furnished above the results obtained are recorded.

A portion of the remaining solution was precipitated by potassium ferrocyanide solution, as directed by the Pharmacopœia.

The remaining solution, acidulated with acetic acid, was precipitated by means of sulphuric acid.

The filtrate from the precipitated sulphate was examined for iron and calcium in the usual manner.

### COMMERCIAL LITHARGE.

A good quality of lead oxide is indispensable in the preparation of Goulard's extract and similar galenicals. Among the queries presented to the A. Ph. A., the following is found:

Commercial litharge is grossly adulterated. What are the adulterants and in what quantity are they present?

The writer examined twenty-five samples of litharge, obtained in each case, as far as known, from a different source. Physically the respective specimens differed little, but evident carelessness in keeping the oxide, especially when procured from paint shops, was apparent.

The color varied in few instances; several samples, however, contained red lead, which was revealed by special examination.

The specimens were examined according to the pharmacopœial directions as to the amount insoluble in acetic acid.

A portion of the acetic solution was precipitated by means of sulphuric acid, and the filtrate examined for copper and iron by means of ammonia water.

Further examinations for zinc, aluminum and calcium were also made in the usual manner.

Every sample of litharge examined contained iron and calcium; aluminum was present in some, while copper and zinc were either absent or present only in trifling amounts.

During the course of these examinations the pharmacopœial directions were found inadequate for complete valuation of commercial litharge, and the necessity of directions for gravimetric or volumetric estimation became apparent. The Pharmacopœia, for instance, gives directions for the determination of impurities insoluble in acetic acid, but fails to recognize the liability of the presence of soluble impurities or adulterants.

The logical deduction from this omission is the necessary introduction of a fixed valuation.

As in the case of the acetate, calcium is present in the lead oxide of commerce, and is liable to interfere, if normal sulphuric or oxalic acid is employed as precipitant.

A gravimetric estimation, by means of sulphuric acid and weighing the dried precipitated sulphate, from a solution of the litharge in acetic acid, was originally employed by the writer, but was discarded for the less tedious volumetric estimation with decinormal potassium bichromate solution.

Before directing the proper precipitant, however, the Pharmacopœia must fix a standard and require a definite per cent. of lead oxide in commercial litharge.

The pharmacopœial limit as to the amount of moisture and carbonate is 2 per cent., that of insoluble impurities 1·5 per cent.

If, in addition to this, another allowance of 1·5 per cent. is made for impurities soluble in acetic acid, such as zinc, calcium, iron, aluminum, etc., an actual percentage of 95 of lead oxide can be demanded in litharge.

If decinormal potassium bichromate solution is employed, ·95 gramme of absolute lead oxide, when in solution, should require for complete precipitation 42·8 c.c.

As each c.c. is equivalent to ·02064 Pb, it is equivalent to ·022236 of lead oxide.

We have, consequently, the following division:

$$\frac{\cdot 95}{\cdot 022236} = 42{\cdot}7$$

and as a slight excess of the dichromate solution is necessary, the above amount can be demanded.

The following addition to the pharmacopœial description of lead oxide may be introduced:

One gramme of lead oxide, dissolved in 5 c.c. of acetic acid, diluted with 5 c.c. of water, by means of a gentle heat, should require for complete precipitation at least 42·8 c.c. of the decinormal potassium bichromate solution, using silver nitrate solution as indicator.

In the following examination of twenty-five specimens of litharge, the pharmacopœial directions were followed, except in the determination of carbonate and moisture.

As volumetric determinations were made, this was not deemed necessary.

In the samples of litharge examined, not one was found which could be considered as grossly adulterated.

EXAMINATION OF COMMERCIAL LITHARGE.

| | Soluble in acid if effervescing. | Amount of residue after solution in $HC_2H_3O_2$ | Nature of residue insoluble in $HC_2H_3O_2$ | Volumetric or gravimetric est. of PbO | Addition of $NH_4OH$ after pption. with $H_2SO_4$ | Iron. | Calcium. | No. of c.c. of $\frac{n}{10}$ $K_2Cr_2O_7$ | Amount of $PbO_2$ | Amt. dissolved by shaking 10 gms. with 100 c.c. $H_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | no effervescence | 2·77 per cent. | metallic and silicious | 95·4 per cent. | slight brown ppt. | small quantity | present | 42·9 | none | no loss |
| 2 | very slight | 1·3 " " | silicious | 97·2 " " | do | do | do | 43·8 | do | |
| 3 | slight | ·7 " " | sandy | 98·9 " " | very slight ppt. | do | do | 44·4 | do | no loss |
| 4 | do | ·6 " " | sandy | 98·2 " " | do | do | do | 44·2 | do | little loss |
| 5 | pronounced | 1·61 " " | brown umber-like | 95·8 " " | flocculent brown | present | present | 43·1 | do | ·04 gm. in 10·0 gms. PbO |
| 6 | some effervescence | ·65 " " | grayish | 97·4 " " | do | do | do | 43·9 | | ·067 in 10·0 PbO |
| 7 | much effervescence | 3·44 " " | dark brown | 95·1 " " | do | do | do | 42·8 | 2· per cent. | no loss |
| 8 | some effervescence | 1·6 " " | metallic | 95·9 " " | do | do | do | 43·2 | none | ·067 in 10·0 PbO |
| 9 | much effervescence | 1·62 " " | reddish brick-like | 95· " " | very dec. brown | decided presence | do | 42·7 | not exam. | ·04 in 10·0 PbO |
| 10 | effervescence | 1·68 " " | metallic | 96·1 " " | yellowish brown ppt. | present | do | 43·3 | do | ·05 in 10·0 gms. |
| 11 | much effervescence | 2·52 " " | reddish brown | 95·2 " " | reddish yellow ppt. | do | do | 42·8 | 1·5 p. c. | ·02 in 10·0 gms. |
| 12 | do | 2· " " | dirty gray | 97·5 " " | do | do | do | 43·9 | none | ·025 in 10·0 PbO |
| 13 | do | 1.43 " " | metallic | 96·95 " " | do | do | do | 43·7 | none | ·1 in 10·0 |
| 14 | some effervescence | 2·42 " " | whitish | 94·37 " " | red ppt. | do | do | 42·5 | present but not estim. | ·025 in 10· PbO |
| 15 | some effervescence | 2·62 " " | reddish | 96·2 " " | red ppt. | very prominent | small amt. | 43·4 | 2· per cent. | no material loss |
| 16 | do | 2·02 " " | metallic | 97·4 " " | do | present | present | 43·9 | none | ·035 in 10·0 gms. |
| 17 | little effervescence | 2·1 " " | metallic | 95·32 " " | do | present | present | 42·9 | none | ·025 in 10·0 Pb |
| 18 | effervescence | 1·31 " " | whitish metallic | 96·1 " " | do | present | do | 43·3 | none | ·067 in 10·0 |
| 19 | do | 3·25 " " | do | 95·45 " " | do | present | do | 42·9 | none | ·025 in 10·0 PbO |
| 20 | consid. effervescence | 1· " " | do | 95·02 " " | do | decidedly | consid. amt. | 42·8 | not exam. | ·025 in 10·0 |
| 21 | little effervescence | ·02 " " | reddish gray | 99· " " | slight ppt. | slight | small amt. | 44·6 | none | no apparent loss |
| 22 | do | 1·2 " " | metallic | 97·9 " " | do | present | present | 44·0 | do | do |
| 23 | effervescence | ·8 " " | reddish brick-like | 98·0 " " | do | do | slight presence | 44·1 | do | do |
| 24 | do | ·81 " " | do | 96·82 " " | do | do | present | 43·5 | do | do |
| 25 | do | 2· " " | dirty gray | 97·1 " " | do | do | present | 43·7 | do | do |

## CERATUM PLUMBI SUBACETATIS.

Probably one of the most unsatisfactory official preparations used for inunction is Goulard's cerate.

Its liability of becoming rancid in a comparatively short time is a source of annoyance to many pharmacists who are compelled to keep a stock of the cerate on hand.

The alkaline nature of the lead subacetate solution has the tendency to saponify the fat employed, and in our older text-books on pharmacy the statement is found that a kind of lead soap is formed.

Continental pharmacopœias endeavor to overcome this difficulty by the substitution of paraffin ointment bases for animal or vegetable fats, changing the preparation from the nature of a cerate to that of an ointment.

But in the employment of petrolatum and similar ointment bases one of the most important objects of Goulard's cerate, its cooling property, is impaired, and this substitution is, therefore, of doubtful value.

The following is the official formula:

| | Grammes. |
|---|---|
| Solution of lead subacetate . . . . . . . . . . . . . . . . . . . . | 200 |
| Camphor cerate . . . . . . . . . . . . . . . . . . . . . . . . . . | 800 |

Mix them thoroughly.

This cerate should be freshly prepared when wanted for use.

The Pharmacopœia gives the operator no special directions how to mix the cerate.

Mixing without melting, with the usual method of incorporation with a spatula on an ointment slab, is doubtlessly to be understood. It is questionable, however, if this method is exclusively followed, especially when large quantities of the cerate are prepared.

The ease and rapidity of incorporating the subacetate solution with the melted cerate is too tempting, particularly if the Pharmacopœia does not furnish prohibitory directions.

It is obvious that the stated saponification is more liable to occur by the employment of this process than where mixture without heat is effected.

An objectionable feature of animal fats in this preparation lies in the production of a yellow or reddish color on standing. This is not only likely to occur in the stock jar of the pharmacist, but in the ointment container of the patient as well, frequently giving rise to unpleasant suspicions.

To prevent this discoloration, the addition of acetic acid to the the fresh cerate is recommended, but it must be considered that this addition is liable to change the chemical character of the lead solution.

The writer has employed various ointment bases for the preparation of Goulard's cerate.

Petrolatum, either yellow or white, will not answer on therapeutical grounds.

The substitution of olive, almond, lard or cotton-seed oil in place of lard in camphor cerate, similar to one of the 1870 Pharmacopœia methods, appears to furnish no improvement concerning preservation.

Some months ago the writer suggested to several physicians the substitution of hydrated wool fat for the camphor cerate, but invariably recommended recent preparation.

The results have, as far as known, been satisfactory, both from the standpoint of preservation as well as therapeutic action.

More recently anhydrous wool fat has been substituted, with the object of doing away with the excess of aqueous liquid.

Eighty grammes of the wool fat, commercially known as Adeps Lanæ, were melted at a low heat, and 20·0 grammes of lead subacetate solution incorporated by stirring until cool.

The finished ointment closely resembles lanolin in appearance, has a satisfactory therapeutic action, and does not show any signs of deterioration on two months' standing. This time is, however, too brief to draw any definite conclusions.

The disadvantage of the lanolin substitute for Goulard's cerate may be found in the ropy consistence of the ointment base.

Unless warmed, satisfactory inunction cannot be accomplished.

Finally, the writer would suggest the following rough valuation of the quality of Goulard's cerate:

Two grammes are introduced into a wide-mouthed vial, holding about 15 c.c.—a half-ounce homœopathic bottle will answer—and 10 c.c. of chloroform added.

The mixture is shaken occasionally, until the fat is dissolved by the chloroform.

If the cerate is of recent preparation or of good quality, the milky mixture will separate into two layers on standing, the lower but slightly milky, and no precipitation will be found on the bottom of the vial.

In an old, rancid or ropy cerate, similarly treated, a white precipitate will be found, and if the cerate is discolored, the varying degrees of intensity will be revealed in the chloroform solution.

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## BALSAM COPAIBA, OIL OF COPAIBA, MASS COPAIBA, RESIN COPAIBA AND GURJUN BALSAM.

By Lyman F. Kebler.

The 1890 U.S.P. recognizes the first four of the above-named products. These are supplied, directly or indirectly, by leguminous shrubs and trees of the genus Copaiba, all natives of tropical America, excepting two African species. According to the investigations of J. C. Umney,[1] the African species supply a very different product from those met with in commerce coming from tropical America. All these varieties and the unknown composition of any of them contribute materially to the difficulties attending a qualitative analysis of the oleoresins.

In 1895 I made[2] a careful comparison of the available methods for detecting gurjun balsam in balsam copaiba. The conclusion arrived at then was that a modification of the glacial acetic acid test gave the most trustworthy results. Since contributing the article referred to above, I have tested many samples of copaiba, some of which were reported as coming to hand in original packages. In every case the glacial acetic acid test was relied on to reveal the presence of gurjun balsam.

Having had an opportunity for accumulating ample material, and to make a further study of the commercial products, it was thought the results and some comments might be of service for future reference. The results of this examination are tabulated below.

The articles examined two years ago, and the samples in the table, marked copaiba, represent the commodity largely used in commerce. Sample collected in 1846 was kindly furnished by Prof. Remington, from his cabinet. The Para samples were very good, except one, which had a specific gravity of 0·9874 at 15° C. This was probably not a normal Para copaiba, but a more concentrated oleoresin. The solidifiable copaiba fairly represents the commercial article. I have never examined a sample that had a specific gravity below 0·9800 at 15° C. and solidified well.

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[1] 1891, *Pharm. J*, Trans. (3), 22, 449. Am. Jour. Pharm., 64, 33. 1893, *Pharm. J.* Trans. (3), 24, 215. Am. Jour. Pharm., 65, 544.

[2] Am. Jour. Pharm., 67, 394.

| Source. | Kind of Balsam. | Specific Gravity at 15° C. | Specific Gravity at 25° C | Per cent of Oil Distilled from Metallic Bath. | Boiling Point of such Oil, C°. | Specific Gravity of such Oil at 15° C. | Specific Gravity of Steam-Distilled Oil at 15° C. | Specific Gravity of Steam-Distilled Oil at 25° C. |
|---|---|---|---|---|---|---|---|---|
| Carthagena . | Copaiba | 0·9560 | 0·9506 | 53 | 250–265 | 0·9207 | 0·8997 | 0·8981 |
| South America | Copaiba | 0·9416 | 0·9372 | 56 | 253–268 | 0·9174 | 0·9014 | 0·9000 |
| Cent. America | Copaiba | 0·9526 | 0·9467 | 76 | 250–274 | 0·9231 | 0·9132 | 0·9067 |
| Collected in 1846 . . . . . | Copaiba | 0·9410 | 0·9381 | 62 | 253–270 | — | 0·9036 | 0·8978 |
| South America | Para | 0·9254 | 0·9200 | 90 | 258–270 | 0·9116 | 0·9079 | 0·9066 |
| South America | Para | 0·9661 | 0·9583 | 88 | 254–268 | 0·9100 | 0·9093 | 0·9037 |
| South America | Para | 0·9874 | 0·9818 | 54 | 253–265 | 0·9346 | 0·9019 | 0·9100 |
| South America | Para | 0·9176 | 0·9116 | 92 | 256–268 | 0·9150 | 0·8951 | 0·9043 |
| South America | Para | 0·9146 | 0·9101 | 90 | 254–264 | — | 0·8936 | 0·8904 |
| South America | Solidifiable | 0·9926 | 1·0000 | 23 | 260–269 | 0·9283 | 0·9201 | 0·9172 |
| Commerce . . | Gurjun | 0·9576 | 0·9516 | — | — | — | 0·9200 | 0·9146 |
| Commerce . . | Gurjun | 0·9796 | 0·9722 | 54 | 245–263 | 0·9202 | 0·9192 | 0·9141 |
| Commerce . . | Gurjun | 0·9531 | 0·9476 | 66 | 240–260 | 0·9146 | 0·9093 | 0·9176 |
| | | | | | B. P. of Oil | | | |
| Commerce . . | — | — | — | — | 258–263 | — | 0·9104 | 0·9087 |
| Commerce . . | — | — | — | — | 260–269 | — | 0·9133 | 0·9101 |

The samples of gurjun were all secured in New York. The two latter items represent commercial oil of copaiba, the last is adulterated with oil of gurjun and the other is pure. The specific gravities at 25° C. were simply taken for data.

There is a very limited demand for solidifiable copaiba, mass copaiba and resin copaiba. The article of which large quantities are used is a copaiba containing from 40 to 60 per cent. of oil. The representative of a large essential oil firm informed me that 1,000 pounds of the latter were sold to *five* pounds of the solidifiable, and *three and one-half* pounds of the resin. This included the territory from Detroit, Mich., east to the Atlantic, through Canada and south to Philadelphia and vicinity. If the above territory is at all representative of the country covered by the U.S.P., it would appear that the commodity which is used more than all the other copaiba compounds ought to have been recognized by our Pharmacopœia.

The present requirements of the Pharmacopœia for balsam copaiba (properly an oleoresin of copaiba) have undoubtedly wrought hardships for some well-meaning druggists. Only the solidifiable is recognized, and practically nothing but an unofficial article is used. From this it can readily be seen that in ninety-nine cases out of a hundred the average druggist is violating the requirements of the Pharmacopœia when he dispenses copaiba, and is thus rendered culpable, especially in some states.

The requirements of the Pharmacopœia for oleoresin of copaiba (balsam copaiba) are also quite inadequate for the end in view. The range of specific gravity for solidifiable is rather too low; 0·9800-1·0173 would be better. On removing the oil, the residue may or may not be brittle, in the absence of any fixed oil. I have removed 90 and 92 per cent. of oil from Para copaiba, and the residue was even then far from being brittle.

The test for detecting gurjun balsam when the article is heated to 130° C. must be in error, since none of the samples of gurjun submitted to this test by me have ever congealed, but became only slightly more viscous. Such a test becomes worthless in mixtures. The other test for gurjun balsam is unreliable.

The tests for oil of copaiba are fairly good. According to my work, the range of specific gravity ought to be a little greater. A test for oil of gurjun should be given. The specific gravity of the latter is a little higher than that of the oil of copaiba; gurjun oil is also somewhat darker in color, but in mixtures these can readily be adjusted.

Resin copaiba might well be dismissed from the Pharmacopœia without any inconvenience to the drug trade. If it is retained, more stringent requirements ought to be added. As it is, almost any resin will answer.

The therapeutical side of the copaiba compounds is an interesting one. The various authorities are generally agreed that an oleoresin containing from 40 to 60 per cent. of oil is the one best suited for gonorrhœal affections and kindred diseases. Those writers who make any comparisons between the oil and the oleoresin almost universally concede the oil to be less efficient than the oleoresin. One recent eminent authority says the oil distilled from the oleoresin is of little value. The same writer considers mass copaiba as a useless and clumsy form of giving the pill.

In U. S. Dispensatory, 17th edition, foot-note, page 445, is the following: "As the virtues of copaiba depend mainly on the oil, this variety (Para) should be more efficacious than the copaiba in common use." Here is room for more therapeutical study. It is evident that the oleoresin containing from 40 to 60 per cent. of oil, and the oil ought to be recognized by the U.S.P., but the other copaiba compounds could be dismissed.

# SHALL FERMENTED AND DISTILLED LIQUORS BE DISMISSED FROM THE UNITED STATES PHARMACOPŒIA?

By Joseph W. England.

The recommendation of the President of the American Pharmaceutical Association, Mr. J. E. Morrison, in his annual address delivered before the recent meeting of that body, held at Lake Minnetonka, that fermented and distilled "liquors" be not recognized by the U. S. Pharmacopœia as medicinal agents—which recommendation, by the by, was voted down by the Association—and the paper by N. S. Davis, A.M, M.D., LL.D., on "The Therapeutic Properties of Alcohol and the Reasons why the Fermented and Distilled Liquors used as Beverages should not be Recognized in the Pharmacopœia as Medicinal Agents,"[1] have both excited interest in the medical and pharmaceutical professions.

President J. E. Morrison, of the American Pharmaceutical Association, takes the ground that the sale of "liquors" by druggists has done an incalculable amount of injury to American pharmacy, that the Government has placed pharmacists who sell "liquors" on the same footing as saloon-keepers; that this condition of affairs should be terminated by the complete abolition of every form of dealing in fermented or spirituous liquors, and that a great advance in this direction would be taken if it were decided to discard all such preparations from the U. S. Pharmacopœia.

The question as to whether fermented and distilled liquors shall be dismissed or not from the U. S. Pharmacopœia is, to my mind, wholly a medical question. If these liquors have sufficient *therapeutic* worth to warrant their use in medical practice, they should be retained. If they have not, they should be dismissed. It is not a matter of sentiment either for or against the liquor traffic. It is a matter of simple justice to the sick. So long as "liquors" are prescribed by a majority of physicians and used by the sick, so long should our national guide-book recognize them, and demand a certain standard of quality, the same as it does for any other *drug*. The mere fact that "liquors" are recognized by the Pharmacopœia

[1] Read before the Section on Materia Medica, Pharmacy and Therapeutics of the American Medical Association, at the meeting held June 1–4, 1897. *Journal of American Medical Association*, August 21, 1897. American Journal of Pharmacy, October, 1897.

does not compel a druggist to keep or sell them if he does not wish; but it does compel him, if he sells them on the orders of physicians, to sell them of a certain quality, or violate official standards. On the other hand, if "liquors" were not officially recognized, there would be no medicinal standards, and the sick would suffer. A "liquor" is sold, or should be sold, by pharmacists only as a drug. If sold for any other reason, then the liquor-dealers masquerading as druggists should be legislated out of the business. The sick should not be punished for needing liquors, nor denied the privilege of obtaining them of standard quality.

Dr. N. S. Davis, in his paper, claims that *physiological* experiments have shown that the presence of alcohol in human tissues retards natural metabolic changes, lessens the processes of oxidation and elimination, diminishes nerve-sensibility, and when repeated from day to day, induces cell and tissue degeneration. What the changes would be in human tissues undergoing *abnormal* metabolic changes, he does not refer to, and yet the clinical value of a drug is an all-important factor. Physiological experiments are necessary, and are good enough, as far as they go; but unless confirmed by clinical results, they are not conclusive.

Further, Dr. Davis alleges that while the present United States Pharmacopœia recognizes wine, whiskey and brandy, *it "does not give a definite official standard of alcoholic strength for either of them."* This is an error. While no *fixed* standard is given, yet it is demanded that white and red wine shall contain 10 to 14 per cent., whiskey 45 to 50 per cent., and brandy 39 to 47 per cent. of alcohol. The most radical claim, however, in Dr. Davis' paper, and the one, doubtless, that will be most disputed by clinicians, is the assertion that alcohol is the *only* important therapeutic agent in all "liquors," and if other therapeutic agents exist in addition to alcohol, that their proportionate quantity and quality is far more variable than is their per cent. of alcohol.

"Almost the only constituents," he writes, "found in whiskey and brandy, besides the alcohol and water, are very variable quantities of *fusel oil*, tannin and, in very old specimens, a trace of some ethereal substance to which connoisseurs attribute the special bouquet. So far from adding to the therapeutic value, the first two substances are regarded as very undesirable impurities, and the last-named has never been isolated in sufficient quantity to have its medical qualities tried."

Let us first note the inaccuracies of these statements. While fusel oil or amylic alcohol is found in recently distilled whiskeys, it is not found in those that have been properly aged, or, if present, it is present, as stated by the Pharmacopœia, in traces only. The Pharmacopœia requires the absence of *all* fusel oil from the official brandy. As to the oak tannin in whiskey and brandy, from the casks, it is only present in traces, and it is difficult to see how it can be regarded as a very undesirable impurity.

If "liquors" have therapeutic worth over simple mixtures of alcohol and water in fixed strengths—and the burden of clinical evidence is that they have—this value must be due to the extractive matters contained in them; and it is upon this line, with regard to a certain constituent of whiskey, that a few words may be said.

During the past five years the writer has examined many samples of whiskey chemically, and next to the alcoholic strength and the absence of fusel oil, one of the most important factors in such examinations has been the determination of the total acidity. The importance of this factor has been generally overlooked, and was pointed out to me by the late Prof. John M. Maisch, who said that he had examined many barrels of whiskey during the Civil War, for the Government, and always found that the best whiskeys had the highest acidity. He referred me to a paper in the AMERICAN JOURNAL OF PHARMACY (1859, p. 573), which he had translated from the German, wherein S. J. Kappel showed the presence of valerianic acid, and the absence of acetic acid, in potato and in rye whiskeys, and expressed the opinion that while valerianic acid was probably the main acid of whiskeys, this had not been positively determined. Since then, the writer has been especially observant of the acid factor in whiskey examinations, and has found that, generally, the oldest, fusel-oil-free, highest-priced, and most strongly alcoholic whiskey has the highest acidity. Occasionally there is an exception. A raw whiskey may be so refined before aging that it will not have the usual amount of the acid-forming compounds, and hence show a low acidity.

The Pharmacopœia of 1890 demands a whiskey "at least two years old," and requires that to render 100 c.c. of whiskey distinctly alkaline to litmus there should be required not more than 1·2 c.c. of normal potassium hydrate solution.

To determine the acidity, a very much better way than the official

method is to use a *decinormal* solution of sodium hydrate, rather than the official normal solution of potassium hydrate, and to employ *10 c.c.* of whiskey, rather than 100 c.c. Place the sample to be examined in a flat-bottomed test tube, resting on a piece of white paper, add a few drops of phenolphthalein solution—do not use litmus, as it is not sufficiently delicate—and run in the soda solution from a burette (graduated to a tenth c.c.). By a little practice, and especially by "checking" results, the end reaction may be very quickly and accurately determined. To measure the whiskey the writer uses a 5 c.c. pipette, graduated to the twentieth of a c.c. Probably one graduated to the one-tenth would answer equally as well.

The results had, during the past five years, in determining the total acidity of some seventy-five samples of whiskey, according to the above method, in the number of cubic centimetres of decinormal sodium hydrate solution needed to neutralize 10 cubic centimetres of a sample, were as follows:

*1893*:—1, 1·1, 1·4, 1·8, 1·2, 0·6, 1, 1·1, 1·2, 1·3, 1·8, 1·5, 1·5, 1·5, 1·5, 1·5, 1·5, 1·5.

*1894*:—1·4, 1·2, 1·6, 1·3, 1·3, 0·9, 0·9, 1·3, 1·3, 1·6, 1·6, 1·6, 1·7, 1·7, 1·6.

*1895*:—1·7, 1·6, 1·4, 1·3, 1·3, 1·3, 1·8, 1·4, 1·5, 1·6, 1·9, 1·6, 1·8, 1·7, 1·4, 1·4.

*1896*:—1·2, 1·2, 1·1, 1·3, 1·7, 1·7, 1·2, 1·5, 1·5, 1·5, 1·5, 1·4.

*1897*:—1·6, 1·3, 1·3, 1·7, 1·3, 1·2, 1·3, 1·5, 1·3, 0·4, 0·5, 0·6, 1·6, 1·7.

It is important to note that the acidity of whiskey does not increase with age beyond a certain point. In May, 1895, the writer examined ten samples of whiskey. None of the samples were less than three years old. The results were in cubic centimetres of decinormal sodium hydrate solution used to neutralize 10 c.c. of whiskey, as follows:

1·7, 1·6, 1·4, 1·3, 1·3, 1·8 1·4, 1·5, 1·6, 1·6.

The same samples were examined a few days since (October, 1897), and the acidity was found to be unchanged.

If valerianic acid is the main acid in whiskey, the reaction in neutralization with sodium hydrate would be as follows:

$$\begin{array}{ccccccc} HC_5H_9O_2 & + & NaHO & = & NaC_5H_9O_2 & + & H_2O \\ 101{\cdot}77 & & 39{\cdot}96 & & 123{\cdot}77 & & 17{\cdot}96 \end{array}$$

Assuming that, in good whiskey, an average of *15 c.c.* of deci-

normal sodium hydrate solution (or 1·5 c.c. of normal) was required to neutralize *100 c c.* of whiskey, this would be equal to 0·06 gramme of NaHO. And if 39·96 grammes of NaHO neutralize 101·77 grammes of valerianic acid, 0·06 gramme should neutralize 0·15 gramme of acid, as follows:

$$39{\cdot}96 : 0{\cdot}06 :: 101{\cdot}77 : 0{\cdot}15.$$

In other words, each *fluid ounce* of whiskey would contain nearly ¾ of a *grain* of free valerianic acid.

The U.S P. (1890) standard of *1·2 c.c.* is, in the writer's judgment, too low for a good whiskey. It should be at least 1·4 or 1·5, and a three or four-year-old whiskey should be required instead of a "not less than two-years-old" product. The U.S P. of 1880 required that 100 c.c. of whiskey should be rendered distinctly alkaline to litmus by *2 c.c.* of the volumetric solution of soda. What the exact chemical changes are that take place in whiskey on aging, whether or not any acetic acid is formed from the ethyl alcohol by oxidation from the air during the process of fermentation, whether acetic ether is produced with acetic acid as an ultimate product, and whether the fusel oil or amylic alcohol present in raw whiskey is directly oxidized by age into valerianic acid, or is first converted into valerianic ether and then into acid, are all questions which have not yet been solved by chemical science, and remain for future work.

The extractive of whiskey most probably has therapeutic worth, as has also the extractives in wines and brandies, and before any action is taken by the Committee on Revision of the U. S. Pharmacopœia, looking toward the dismissal of these products, there should be a thorough and extended examination made of them chemically and therapeutically.

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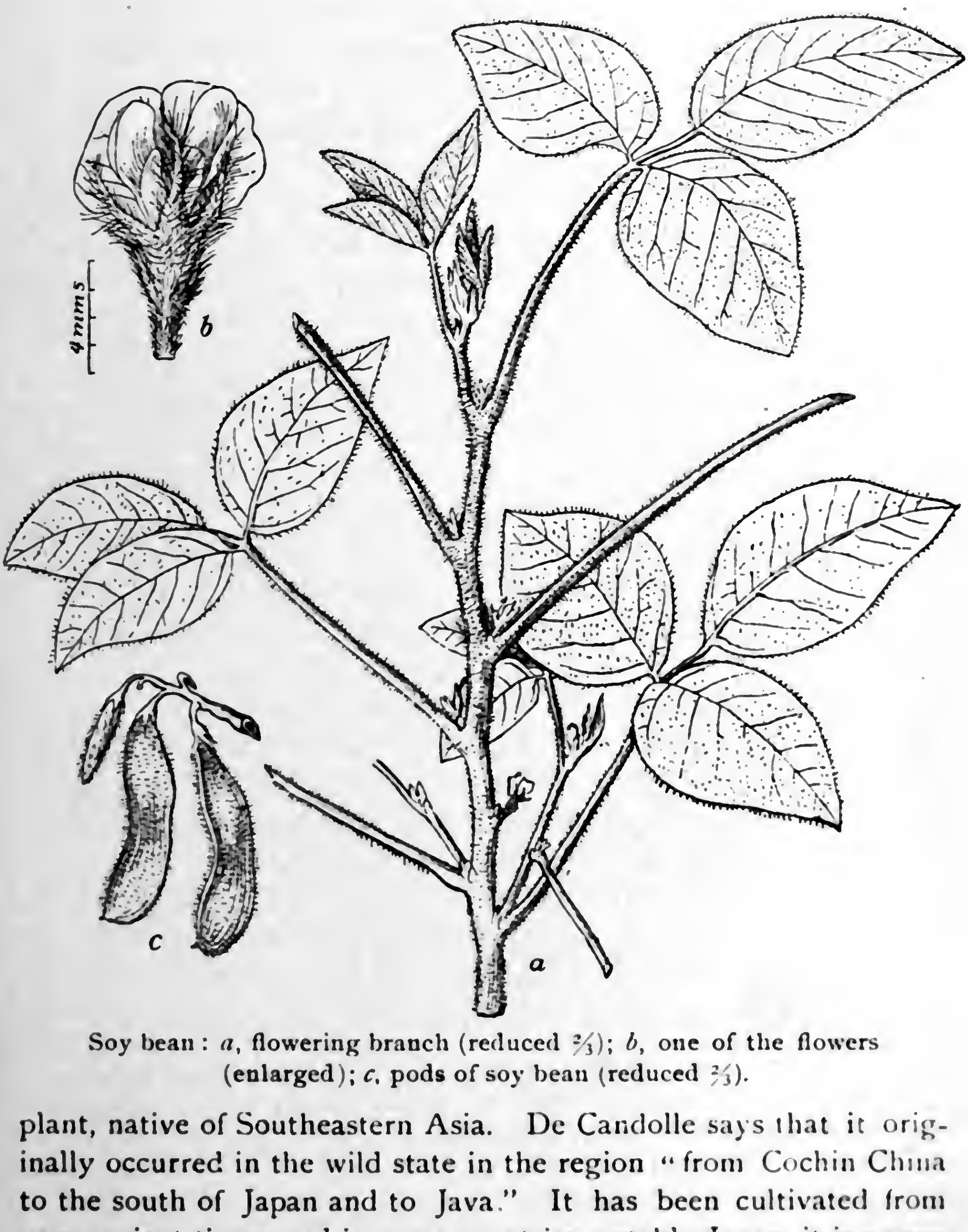
## THE SOY BEAN.

By Henry Trimble.

In this Journal for June, 1896, the writer published a summary of the literature of this bean, which bean is of especial interest to pharmacists because of the digestive ferment said to exist in it. Recently the U.S. Department of Agriculture has issued Farmers' Bulletin No. 58, entitled "The Soy Bean as a Forage Crop," by Thomas A. Williams, under the direction of F. Lamson-Scribner, with an appendix on "Soy Beans as Food for Man," by C. F. Langworthy, Ph.D.

While not adding anything new to the knowledge of the digestive ferment, still there is so much valuable information in the report as to make it desirable to reproduce it in abstract.

*General Characteristics and Origin.*—The Soy Bean, Glycine hispida, previously, but incorrectly, called soja bean, is a leguminous




Soy bean : *a*, flowering branch (reduced ⅔); *b*, one of the flowers (enlarged); *c*, pods of soy bean (reduced ⅔).

plant, native of Southeastern Asia. De Candolle says that it originally occurred in the wild state in the region "from Cochin China to the south of Japan and to Java." It has been cultivated from very ancient times, and in some countries, notably Japan, it is a very important food plant, and its cultivation has reached such an

advanced stage that innumerable varieties and forms have been developed. Professor Rein says it is the most important legume in extent of varieties, uses, and value grown in China or Japan. It is supposed to have been used for food in China even before the time of Confucius. Although it has been grown in China and Japan for such an extended period, its cultivation seems to have spread very slowly to the surrounding countries. Its introduction into India seems to have taken place in comparatively modern times. More recently it was brought to Europe, where it was grown in botanic gardens for more than 100 years without attracting attention as a plant of much economic importance. Aiton says in his Hortus Kewensis that it was first brought to England in 1790. In 1875 Professor Haberlandt began an extensive series of experiments with this plant in Austria-Hungary, and in a work published in 1878 he gave the results of his studies and strongly urged the cultivation of the soy bean as a food plant for both man and beast. Although he succeeded in exciting a great deal of interest in its cultivation while making his experiments, and distributed a considerable amount of seed, very little seems to have come of it; for at his death, which occurred in 1878, the interest flagged, and the soy bean has failed to obtain the place as a staple crop which he prophesied for it.

In our own country soy bean has been grown for a great many years, chiefly in the South, but it is only within the last fifteen years that it has received much attention as a forage crop. Recently it has been the subject of considerable experimentation at a number of the experiment stations, and its great value as a crop has been clearly demonstrated.

The term "soy" applied to this bean is derived from a Japanese word "shoyu," denoting a certain preparation from the seeds which is a favorite article of diet in that country. The term "soja" is often used in connection with this plant, but Professor Georgeson, who spent some time in Japan, and who, since his return to this country, has experimented extensively with this plant, says:

> The term soja, often applied to this bean, is misleading, inasmuch as the species named by Siebold and Zuccarini *Glycine soja* is not cultivated there (Japan), or at least rarely cultivated, though wild in the South; and later this species was confounded with the cultivated species, *G. hispida* Moench., whence the origin of the term soja, as applied to the cultivated bean.

Recent works on Japanese botany seem to substantiate this posi-

tion, though it is still a matter of doubt as to what botanical name properly belongs to the cultivated species.

The soy bean is an erect, annual plant, with branching hairy stems, trifoliate, more or less hairy leaves, rather unconspicuous pale lilac or violet-colored flowers, and broad, two to five-seeded pods covered, like the stem, with stiff, reddish hairs. The seeds vary in color from whitish and yellowish to green, brown and black, and in shape from spherical to elliptical and more or less compressed. Under favorable conditions the plant may reach a height of four feet or more.

In Professor Haberlandt's experiments in Austria-Hungary the plants yield about 200 pods and 450 seeds each, and though this is probably considerably above the average, it shows them to be remarkably prolific.

The fact that the flowers are self-pollinated makes the yield entirely independent of insects, and renders the soy bean free from an important obstacle in the way of the introduction of many legumes into new regions.

*Varieties.*—The different varieties of soy bean are distinguished largely according to the color, size and shape of the seed and the time required for the plants to reach maturity. The names applied in the United States are, for example, "Early White," "Medium Late Green," "Medium Black," etc. The early varieties generally fruit heavier in proportion to the size of the plant than the later ones, and hence are better to grow for seed, while the medium or late varieties are better for forage, on account of the larger yield of fodder that may be obtained.

*Conditions of Growth.*—It is believed in Japan that in northern climates soils of a rather strong character are best adapted to the soy bean. It is usually sown about the end of May, and when used for hay cut early in August. In both Europe and America it has been found to thrive best on soils of medium texture, that are well supplied with potash, phosphoric acid and lime. Fairly good results have been obtained in Kansas on very poor soils, and under very adverse conditions as to moisture. In South Carolina the soy bean gives excellent crops on sandy limestone or marshy soils, and also on drained swamps or peaty lands that are well marled. The temperature should be about the same as that required for corn. The methods of culture are such as are usually recommended for ordinary field beans.

*Chemical Composition.*—The following tables on the chemical composition of the various parts of the soy bean used for feeding purposes, have been arranged with great care, to show as far as possible the latest and best results obtained by experimenters in the United States during the course of their studies of this plant:

CHEMICAL COMPOSITION OF THE VARIOUS KINDS OF FORAGE MADE FROM THE SOY BEAN.

| Soy-Bean Forage. | Number of analyses. | Fresh or Air-dry Substance. | | | | | | Water-free Substance. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Water. | Protein. | Fat. | Nitrogen-free Extract. | Fiber. | Ash. | Protein. | Fat. | Nitrogen-free Extract. | Fiber. | Ash. |
| Fodder (early bloom to early seed)[1] | 13 | 76·5 | 3·6 | 1·0 | 10·1 | 6·5 | 2·3 | 15·3 | 4·1 | 43·0 | 27·6 | 10.0 |
| Soy-bean hay (Japanese) | 1 | 16·0 | 16·9 | 2·2 | 23·1 | 35·9 | 5·9 | 20·1 | 2·6 | 27·5 | 42·7 | 7·0 |
| Soy-bean hay (Mass.)[2] | 4 | 12·1 | 14·2 | 4·1 | 41·2 | 21·1 | 7·3 | 16·2 | 4·7 | 46·8 | 24·0 | — |
| Soy-bean straw (Mass.)[2] | 3 | 11·4 | 4·9 | 1·9 | 37·8 | 37·6 | 6·4 | 5·5 | 2·2 | 42·7 | 42·4 | — |
| Soy-bean straw (hulls and vines after threshing)[3] | 1 | 5·7 | 4·0 | 0·8 | 36·0 | 49·5 | 3·9 | 4.25 | 0·85 | 38·2 | 52·6 | 5·3 |
| Soy-bean seed[4] | 8 | 10·8 | 34·0 | 16·9 | 28·8 | 4·8 | 4·7 | 38·1 | 18·9 | 32·2 | 5·4 | 5·3 |
| Soy-bean meal[5] | 2 | 10·4 | 36·0 | 18·9 | 27·0 | 2·6 | 5·1 | 40·2 | 21·0 | 30·2 | 2·9 | 5·7 |
| Soy-bean ensilage[6] | 1 | 74·2 | 4·1 | 2·2 | 7·0 | 9·7 | 2·8 | 15·7 | 8·7 | 27·0 | 37·6 | 11·0 |
| Corn and soy-bean ensilage[7] | 4 | 76·0 | 2·5 | 0·8 | 11·1 | 7·2 | 2·4 | 10·4 | 3·3 | 46·3 | 30·0 | — |
| Millet and soy-bean ensilage[7] | 9 | 79 | 2·8 | 1·0 | 7·2 | 7·2 | 2·8 | 13·3 | 4·8 | 34·3 | 34·3 | — |

[1] Ninth An. Rep. Storrs Exp. Sta., pp. 281, 285 (1896).
[2] Eighth An. Rep. Mass. Hatch. Sta., p. 87 (1896).
[3] Second An. Rep. S. C. Exp. Sta., p. 179 (1890).
[4] Bull. 15 U. S. Dept. Agric., Office Exp. Stations, p. 390 (1893).
[5] Eighth An. Rep. Storrs Exp. Sta., pp. 183, 186 (1895).
[6] Bull. Tenn. Exp. Sta., Vol. IX, No. 3, p. 106 (1896).
[7] Ninth An. Rep. Mass. Hatch Sta., p. 110 (1897).

If the preceding analyses are compared with those of other leguminous crops, it will be seen that the soy bean ranks high from a chemical point of view. The green fodder has much the same composition as red clover, being slightly lower in crude protein and higher in crude fiber. In the two most important substances, crude protein and fat, the soy bean is considerably richer than the cowpea. The hay also shows a relatively high fat and protein content. The only available analysis of soy bean ensilage shows it to agree very closely in composition with red clover ensilage, being higher in

crude fiber and fat, and lower in extract matter. From the analysis of the beans it will be seen that there are about two-fifths protein and one-sixth fat, with but very little fiber present, making them almost as rich in crude protein as the best cotton-seed meal, with a higher percentage of fat. They contain three times as much crude protein and nearly three and a half times as much fat as oats; nearly three and one-half times as much protein and about three times as much fat as corn, and almost twice as much crude protein, and over twelve times as much fat as peas; all of which show them to form one of the most concentrated of our feeding stuffs.

*Digestibility.*—The chemical analysis alone will not prove the feeding value of a forage crop. Soy bean meal has a high percentage of digestibility. It contains almost two and one-half times as much digestible protein, and over five times as much digestible fat as the common roller process, wheat bran, and its digestibility is decidedly higher in everything but the fat than that of cotton-seed meal. The experiments which confirmed these statements were made on cattle and sheep, chiefly the latter.

*As a Soil Renewer.*—One of the great advantages in growing leguminous forage crops lies in the benefit which the soil derives from the nitrogen and other important elements of plant food that are left in it by the crops. Soils that have become impoverished by continuous cropping with small grains of other nitrogen-using crops may be restored to fertility by the use of leguminous crops, as, for example, the clovers, cowpeas, vetches, lupines, and the soy bean. The value of a crop as a soil restorer depends upon the amount of available plant food which it adds to the soil, and also upon the effect which the roots have upon the mechanical condition of the soil. Leguminous plants, through the aid of the root tubercle organisms, are able to add to the available nitrogen of the soil, and hence are extensively used in restoring those deficient in that element.

The soy bean is highly valued in Japan as a nitrogen gatherer and is extensively grown in rotation with cereal crops. When the soy bean was first introduced into the United States it did not form root tubercles, owing to the absence of the tubercle organism from the soil, and it has been grown for several years in some localities without the appearance of any tubercles. In other cases the tubercles have developed in great abundance a ter a short time. At the

Massachusetts (Hatch) Station the medium green soy bean produces great numbers of the tubercles. At the same station it was found that a liberal application of nitrates interfered with the development of the tubercles.

In experiments made at the Storrs Experiment Station soy beans were planted in soil uninfested with the tubercle microbes, and then later in the season (about the middle of July) a portion of the field was inoculated with infected soil. Tubercles were produced on the plants in the inoculated land, but owing to the lateness of the inoculation, they made but little development, and no difference could be noticed between the crops grown on the two parts of the field.

*Soy Beans as Food for Man.*—The soy bean has been used as a food for man in Japan, China and neighboring countries, from the earliest times. In more recent years it has been cultivated for this purpose in Europe. Analyses were given in this JOURNAL, June, 1896.

Comparatively little information is available concerning the chemical character of the different constituents of the soy bean. According to the Japanese investigators, the bean contains, on an average, 7·5 per cent. of nitrogen, 6.9 per cent. being albuminoid nitrogen, exclusive of peptones, 0·1 per cent. amide nitrogen, and 0·3 per cent. nitrogen of peptones. Osborne studied the nitrogenous constituents of white or kidney beans. He found that they contained on an average 23·5 per cent. of protein, made up of phaselin and phaseolin. The percentage of protein in the soy bean is much higher than this, and it is not improbable that it differs materially in chemical character. According to Japanese authors, the soy bean contains no starch. No statements have been found concerning the character of the fat.

The fact is well recognized that beans of all kinds are valuable food because of the large amount of protein and fat which they contain. In order that the nutrients may be available, the beans must be cooked or prepared in some way so that the cell walls may be broken down and the contents readily acted on by the digestive juices. What is true of beans in general, is especially true of the soy bean. Though it is eaten more extensively in China and Japan than in any other countries, so far as can be learned it is never eaten there as a vegetable, but more or less complex food products are prepared from it. At least five preparations are commonly made in

Japan from the soy bean. These are natto, tofu, miso, whose preparation has already been described in this Journal, and yuba and shoyu.

A sort of film forms on the surface of soy-bean milk which in appearance suggests cream. This material is sometimes prepared in quantity by evaporating the milk, and when dried it is used as an article of food under the name of yuba.

Shoyu is a sauce prepared from a mixture of cooked and pulverized soy beans, roasted and pulverized wheat, wheat flour, salt, and water. The mass is fermented with rice-wine ferment in casks for from one and a half to five years, being very frequently stirred. The resulting product is a moderately thick brown liquid. In odor and taste it is not unlike a good quality of meat extract, though perhaps a trifle more pungent. Under the name of soy sauce it has been known in India, and to some extent in Europe, for many years.

The composition of each of the above-described foods is given in the following table:

| Soy-bean food products. | Water. | Protein. | Fat. | Nitrogen-free extract. | Fiber. | Ash. |
|---|---|---|---|---|---|---|
| | *Per cent.* | *Per cent* | *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* |
| Fresh tofu | 89·00 | 5·00 | 3·40 | 2·10 | — | 0·50 |
| Fresh tofu | 89·29 | 4·87 | — | 4·35 | — | 0·48 |
| Frozen tofu | 18·70 | 48·50 | 28·50 | 2·60 | — | 1·70 |
| Natto | 15·32 | 41·42 | 23·65 | 15·05 | 1·48 | 3·08 |
| Yuba | 21·85 | 42·60 | 24·62 | 7·65 | — | 2·82 |
| White miso | 50·70 | 5·70 | 24·40 | | 12·60 | 6·60 |
| Red miso | 50·40 | 10·08 | 18·77 | | 8·25 | 12·50 |
| Swiss miso | 12·53 | 26·43 | 13·91 | 19·54 | 1·41 | 26·18 |
| Shoyu | 63·29 | 8·31 | — | 5·10 | — | 19·45 |
| Shoyu | 67·42 | 7·37 | — | 4·06 | — | 17·47 |

It will be noticed that most of these soy-bean products are fermented; that is, they are prepared with the aid of microörganisms. The cell walls and other carbohydrate material are broken down and the cell-contents rendered more accessible to the digestive juices, and at the same time peculiar and pleasant flavors are developed. The special microörganisms used in the preparation of these foods have been studied in recent years. The manufacture of these

products is of very ancient origin, and affords an interesting practical illustration of the use of bacteria for economic purposes.

Though these soy-bean products are prepared chiefly in Japan and other eastern countries, their manufacture has been attempted to some extent in Switzerland and elsewhere.

The statement is frequently made that the Japanese live almost exclusively upon rice, eating little or no meat. It is not, however, generally known that the deficiency of protein in the rice is made up by the consumption of large quantities of shoyu, miso, or other soy bean products. It is stated on good authority that these products actually take the place of meat and other nitrogenous animal foods in the Japanese dietary. They are eaten in some form or other by rich and poor at almost every meal.

A large number of dietary and digestion experiments have been made in Japan in which soy bean preparations formed a considerable part of the food consumed, although no experiments have been made, so far as can be learned, in which such preparations were eaten alone. Generally speaking, the nitrogen was well assimilated. For instance, when 12 grammes of nitrogen were consumed daily, the dietary consisting of soy bean cheese and rice, only 0·1 gramme of nitrogen was excreted in the feces. When 13·9 grammes of nitrogen was consumed daily in a dietary of bean cheese and barley, only 1·4 grammes was excreted in the feces. According to one author, in a dietary containing a large amount of bean cheese, 90 per cent. of the protein, 89·9 per cent. of the fat, and 14·5 per cent. of the crude fiber are digestible. The general opinion of Japanese investigators and others familiar with oriental dietetics is, that the protein in articles of food prepared from soy beans is in a very available form, and that these preparations are most valuable foods.

Bean sausages in considerable variety are prepared in Germany, and formed part of the ration of the German soldier in the Franco-Prussian war. So far as can be learned, these are always made from ordinary varieties of beans and not from soy beans.

Since soy beans contain no starch, they have been recommended as food for persons suffering from diabetes. A soy bean bread for this purpose is manufactured in Paris.

Under the name of coffee beans, soy beans are eaten to some extent in Switzerland as a vegetable, and dried and roasted are also used as a coffee substitute. Their use for this latter purpose is not

unknown in America. The attempt has recently been made by certain dealers to place the soy bean on the market as a new substitute for coffee, and to sell it under other names at an exorbitant price.

Bulletin No. 98, of the North Carolina Experiment Station, recommends soy beans as a palatable vegetable when prepared as follows: Soak the beans until the skins come off, and stir in water until the skins rise to the surface and then remove them. Boil the beans with bacon until soft, season with pepper, salt and butter, and serve hot. If the beans are green the preliminary soaking may be omitted. No other references to the use of soy beans for human food in the United States have been found.

Several of the Bulletins issued by the College of Agriculture of the Imperial University of Japan contain valuable articles on the soy bean and its products.

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## THE PRESENT STATUS OF THE HYOSCINE-SCOPOLAMINE QUESTION.[1]

By Louis Merck, Ph.D.

Hyoscine has been an object of active controversies, more so, probably, than any other one of the notable alkaloids. These controversies, after apparently becoming dormant for a time, have again and again sprung up and engaged scientists of note on opposite sides.

It was from the so-called amorphous hyoscyamine, the mixture of bases obtained from hyoscyamine seeds, that Ladenburg first isolated a substance to which he gave the name of hyoscine. The same discoverer assigned to the newly-found base the formula $C_{17}H_{23}NO_3$, thus claiming it as an isomer of atropine and hyoscyamine. Hesse, on the other hand, contended that the new base was possessed of the composition $C_{17}H_{21}NO_4$. He also declared it to be identical with the substance which E. Schmidt had isolated from scopolia atropoides, and which had been named scopolamine. Subsequently, E. Schmidt found the hyoscine hydrobromate of the markets to consist almost exclusively of the hydrobromate of scopolamine. He does not, however, consider the *non-existence* of a hyoscine $C_{17}H_{23}NO_3$ to be thereby demonstrated. He argues in favor of the possibility that a base of such composition may indeed occur in

[1] *The Journal of the Society of Chemical Industry*, June 30, 1897.

the mixtures of alkaloids obtained from the solanaceæ; that Ladenburg had actually got hold of that base, which gave him the data for his formula and description of what he called "hyoscine," and that the same base has since then happened to be isolated again.

Be that as it may, the "hyoscine" put upon the market by E. Merck has been and is assuredly identical with scopolamine. It is only for the purpose of obviating misunderstandings in commercial and medical circles, where a change of name is apt to create great confusion, that our house has retained in its trade-list the designation of "hyoscine" for the base from hyoscyamus, while applying that of "scopolamine" to the base from Scopolia atropoides. Since the opening of this controversy, the Merck laboratories have, in working considerable quantities of the solanaceous drugs for alkaloids, steadily been directed toward the object of identifying a base $C_{17}H_{23}NO_3$, which is to possess the properties of hyoscine. So far, however, we have not succeeded in isolating such a base.

In the course of these labors we were indeed fortunate enough to isolate a base $C_{17}H_{23}NO_3$, thus isomeric with hyoscyamine and atropine, from Duboisia myoporoides. This base we have named "pseudo-hyoscyamine." Its properties, however, differ essentially from those known for hyoscine. For instance, hyoscine is an oily liquid, while pseudo-hyoscyamine melts at about 132° to 134°. Thus, the possibility of any confusion between these two appears wholly excluded. The base isolated from Duboisia myoporoides by J. Gadamer (albeit in quantity insufficient for exact determination) is equally unlikely to represent Ladenburg's "hyoscine," inasmuch as Gadamer, from his analytic results, concludes that it contains but 15 atoms of carbon. Our own investigations at the works covered these solanaceous drugs: Belladonna, duboisia, datura, stramonium, hyoscyamus, scopolia.

On examining even very large quantities of the bases residuary from the manufacture of atropine, we have so far encountered no substance which would, even approximately, be capable of identification with the "hyoscine $C_{17}H_{23}NO_3$." Furthermore, repeated efforts were made by us to isolate all the alkaloids from duboisia. All that were obtained on such occasions were: hyoscyamine, hyoscine (or scopolamine) $C_{17}H_{21}NO_4$, considerable quantities of amorphous bases, and pseudo-hyoscyamine. Never was an alkaloid met with in this work answering to the formula given by Ladenburg for

hyoscine, and at the same time possessing its characteristic properties regarding salts and double salts—properties which would have rendered such an alkaloid incapable of being overlooked. The same negative result was had from investigation of the alkaloids of stramonium seeds, which, likewise, were worked in quantities of thousands of kilogrammes. The Merck laboratories are also continually working, for alkaloids, large quantities of hyoscyamus seeds and scopolia roots. Also, in these lines of manufacture, we constantly kept our attention directed toward isolating the alkaloids occurring among the residuary bases. Nevertheless, the search for the particular base here in question has proved equally fruitless on these two drugs.

In this connection I may be pardoned the liberty of alluding to still another interesting fact developed at our laboratories. The statement is frequently met with in literature, that hyoscine (that is, scopolamine) has been isolated from the residual bases obtained in the manufacture of atropine. Therefore, it might readily be inferred that hyoscine is a side-base to hyoscyamine or atropine in the belladonna. We have studiously kept this issue in view during the working of many hundreds of thousands of kilos of belladonna roots. And still we have never been able to discover hyoscine (meaning scopolamine) among the residual bases resulting from these extensive operations. This experience of ours thus directly contradicts the inference before mentioned. The experiences of others, as quoted before, may be presumed to have been due to defective sorting of the belladonna roots, among which may have remained roots of other solanaceæ. Or, the residues remaining from the manufacture of various solanaceous alkaloids, and utilized for obtaining side-bases, may not have been kept absolutely apart.

It may be contended that, in the Merck researches, the hyoscine or scopolamine that might have been present could have been overlooked in consequence of its own minimal quantity. This contention, however, is met by the fact that the mixtures of residual bases were, at the end, also subjected to splitting; whereupon the appearance of scopoline among the products of this operation must have indicated that hyoscine had been present, if such were indeed the case. From a single batch, for instance, of residual bases thus treated, 100 kilos of tropine were obtained, whereas the presence of a higher-boiling base was not demonstrable.

To return, after this little digression, to my main topic, I would once more summarize our laboratories' experiences regarding the latter, to wit: With due consideration of the various solanaceous drugs, and with the use of very considerable quantities of them, the results so far have failed to show the possibility of obtaining a base possessing the properties of hyoscine and answering to Ladenburg's formula of $C_{17}H_{23}NO_3$. Thus, this whole question has by this time dwindled down almost exclusively to a controversy between O. Hesse and E. Schmidt as to the propriety of designating the surely-established alkaloid $C_{17}H_{21}NO_4$, either as "scopolamine" or as "hyoscine."

The polemics between the two investigators named have, however, recently extended into still another chapter of the solanaceæ-alkaloid research, which bears close relations to the one I have here discussed. O. Hesse published an observation made by him in the scopolamine hydrobromate of commerce, to this effect: He frequently found this salt to contain also notable quantities of another base, differing from scopolamine by the absence of optical rotatory power. This would, of course, have the result that such a mixed salt would show a smaller arc of rotation than that due to the pure scopolamine hydrobromate.

He succeeded in isolating this inactive base and gave it the name of "atroscine." Hesse argues against any supposition of identity as between his "atroscine" and the so-called "inactive scopolamine," found by E. Schmidt. His reasons herefor are two: Firstly, he did not succeed in obtaining, by the treatment of hyoscine with alkalies, an inactive base of equal composition. Secondly, he claimed, on the other hand, that the decrease in optical activity resulting in hyoscine upon treatment with alkalies is due altogether to a splitting of the hyoscine into a "split-base," which he calls "oscine," and tropic or atropic acids. O. Hesse's "oscine" is stated as being identical with E. Schmidt's split-base "scopoline."

E. Schmidt, again, gives the genesis of his "inactive scopolamine" as being likewise brought about through the action of alkalies on scopolamine, with the additional statement that it can also be produced by using silver oxide instead of the alkalies. He states that he never encountered any "atroscine" in the process of isolating alkaloids from commercial scopolia roots or hyoscyamus seeds. Schmidt further explains that accordingly as the liquors from scopolia root are treated with less or more intensively-acting alkalies,

one may obtain at will either a normal scopolamine (rotating about 24° to 25°), or a feebly rotating one. He succeeded even in directly obtaining, from one and the same scopolia root, a normally (that is, strongly) rotating and a feebly rotating scopolamine. The former was obtained by alkalinizing the liquors with sodium bicarbonate or ammonia; the other by employing strong bases, such as soda-lye, concentrated solution of potassa, etc.

It is thus still an open question whether or not Hesse's "atroscine" should be regarded as identical with Schmidt's "inactive scopolamine." Upon considering the contradictory verdicts of medical authorities who have tested both these substances as to their action on the eye, one might almost incline toward the second alternative, that is, non-identity.

O. Hesse, in his treatise, quotes medical councillor Dr. Königshöfer's conclusions from physiological tests made by him with atroscine, to the effect that its action differs in certain points from that of scopolamine. The passage quoted reads as follows: "We thus find that this remedy (that is atroscine) acts identically with atropine and scopolamine, in so far as its mydriatic effect is concerned; while in the matter of paralyzing the accommodation it considerably surpasses both these substances in promptness of action, as well as in duration of effect, the ratio of difference ranging from double to quadruple."

E. Schmidt, on the other hand, reports that Prof. Dr. Uhthoff, director of the eye clinic at the University of Marburg, in conjunction with Dr. Axenfeld, lecturer, arrived at the following important conclusion: In comparative tests with a strongly rotating scopolamine hydrobromate (25·43°) and a very feebly rotating salt (6·62°), " . . . . it was found that no difference, whatever, could be shown between the effects of these two salts."

To these contradictory reports published by Schmidt and by Hesse, I can add the following facts, gathered from observations made by us at the Darmstadt Laboratory. Ever since this property of hyoscine, of strongly rotating the plane of polarization, has been known, special regard has been given to this point at our laboratories in working the side-bases from hyoscyamus seeds for hyoscine. The product of each separate batch was invariably examined for the determination of its optical properties. In the course of these observations it was found that we always obtained a

hyoscine of normal rotatory power with but very slight variations, that is, ranging between about 24° and 25°. We have been unable so far to discover a feebly rotating preparation obtained from hyoscyamus seeds.

In the manufacture of scopolamine from scopolia roots, we made the optical rotatory power a subject of special research only quite recently, and in consequence I can give you the results only on an amount of scopolamine obtained from about 10,000 kilos of the roots. The scopolamine hydrobromate from this quantity, on being crystallized, was shown to be absolutely pure, but to possess a lævo-rotatory power of only 13·47°.

In connection herewith I should state that, in working the scopolia roots and in working up the side-bases for scopolamine, exactly the same stages were adhered to, as in working the hyoscyamus seeds and in working up their side-bases for hyoscine. Especially in the manner of using alkali in both series, the most punctilious care and attention were exercised in order to make the conditions in both exactly equal. Hence, I cannot well refrain from the conclusion that the alkali can hardly have caused the difference in rotatory power in these cases of ours; for had it done so, a more feebly rotating product must have resulted in the isolation of the hyoscine as well as in the other case. This experience seems to me to argue largely in favor of O. Hesse's view, that two chemically equal basic substances, which so far can be distinguished from one another only by their optical activities, are contained in the ordinary scopolamine hydrobromate, and that, quite possibly, they exist preformed already in the scopolia root.

The few observations so far available cannot, of course, suffice to settle the pending controversy; but it affords me gratification to be in a position to promise the early publication of further results from considerably larger batches of scopolia roots, in which, likewise, the various results will be most carefully noted, which I hope may contribute toward the elucidation of this question.

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*Tonca* or *Tonquin Beans*, according to *Bulletin of Miscellaneous Information*, Trinidad, October, 1897, were imported from Venezuela in 1896 to the value of £130,985. Rum to the extent of 11,000 gallons was used in curing them; the greater part of the product was shipped to the United States, only £1,091 in value going to other places. See also this JOURNAL, March, 1897, page 157.

# THE MANUFACTURE AND APPLICATIONS OF LACTIC ACID.[1]

By Alan A. Claflin.

This paper consists of extracts from notes on observations taken during seven years' experience in the manufacture of lactic acid on a large scale, on lines laid down by my predecessor, Mr. Chas. E. Avery. While some of my facts are not new, considerable work having been done very recently on this subject, and while none of my investigations have been carried farther than the daily exigencies of manufacture required, yet I trust that from the exceptional opportunities that I have had, they may be found of interest.

The lactic acid industry dates back about twenty years, when Mr. Avery began his investigation, which resulted in the process which he covered from 1881 to 1885 by American and foreign patents. The production of lactic acid on a large scale by fermentation is interesting because it employs micro-organisms to split up the glucose molecule into two molecules of ethylidene lactic acid. The micro-organism that does this work is well known as the bacillus acidi lactici. This bacillus has been described variously—not from any inaccuracy of the observer, but because it is of great variety itself, a certain variety developing most rapidly in a certain medium. The bacillus which does the work in a highly nitrogenous saccharine solution is a large species. Its form is a double truncated cone, averaging in length 2 to 2½ millimetres, and about 1 millimetre in diameter. It has the tendency of all lactic bacteria to link itself together in pairs or short chains. The most abundant lactic bacteria in sour milk are only $\frac{8}{10}$ millimetre long, but a little thicker in proportion than those found in my saccharine solutions.

The manufacture of lactic acid has three divisions: The preparation of the saccharine solution, the fermentation, the conversion of the fermented liquor into commercial lactic acid. The source from which the saccharine solution is obtained is not important. The location of the factory determines the raw material that can furnish a glucose liquor most cheaply. The proportional composition of the saccharine solution is very important. For complete decomposition the saccharine solution should not vary between the limit

[1] *The Journal of the Society of Chemical Industry*, June 30, 1897.

1·05 to 1·075 sp gr.; for technical reasons the higher density is preferable. A solution of that density will contain from 7½ to 11 per cent. of saccharine matter. It is not essential to have all the saccharine matter in the form of grape sugar. In fact, it seems to be advantageous to have 10 to 15 per cent. of it as cane-sugar, which, becoming inverted in the process, furnishes fresh material, as it were, for the ferment. To do its work thoroughly, the lactic bacillus needs to be well nourished by nitrogenous matter. The most convenient form for this nitrogenous material is as it comes from vegetable life, as extracted, for instance, from bran by the action of boiling water and dilute acid. At different times I have used material obtained from animal and mineral sources. In the laboratory it is difficult to detect material differences. On the large scale, I prefer a vegetable source; there seems to be a complete utilization of the material. The amount of nitrogenous material should be at least 8 per cent. of the saccharine constituents. I assume by nitrogenous matter a body of substantially the composition of albumin, containing 15 to 20 per cent. of nitrogen in complex form. Perhaps it would be more accurate to say the total nitrogen should be nearly 2 per cent. of the saccharine material, and preferably combined with carbon. If a mineral food is to be employed, ammonia salts should be in larger proportion than nitrates. A low percentage of phosphates will suffice, and the presence of such potassium does not seem to be essential.

The requisite saccharine solution made up and boiled for at least an hour, to make sure of sterilization, is conveyed into the fermentation tank. There it is rapidly cooled to 55° C. or lower, not going below 45°, and impregnated. Impregnation takes place at a higher temperature than observers have generally stated, a peculiarity perhaps arising from the large scale at which the work is carried on. I may state here, in a general way, that the modified conditions caused by working the bacteria on a large scale give an opportunity for variation from laboratory results. A large body of fermentable liquor is less susceptible to foreign spores, more energetic in its development, and productive of more obvious results than a solution such as is usually found in the laboratory. Consequently I feel that the chemist, who is to investigate and utilize, to the fullest extent, nature's great oxidizing agent, the mycoderma aceti, and nature's great reducing agent, the bacillus butyrici, must be as

familiar with them in a 5,000-gallon vat as in the pure culture state in a test tube.

In continuous manufacture the ferment solutions are impregnated from a preceding ferment liquor, in which a lively fermentation is in progress. Decided advantage is obtained by using a generous amount of such liquor. Twenty per cent. is none too much. For an original impregnation, lactic bacteria must be obtained from an outside source. I prefer to use for that source milk that has been allowed to stand at a temperature of 45° until slightly sour. If the milk is allowed to sour too long, before using as an impregnating fluid, a tendency is shown for butyric bacilli to develop. This same objection is true if rotten cheese is used. Should the saccharine solution be allowed to ferment spontaneously, everything may happen or nothing. A good lactic fermentation may develop, a meagre alcoholic or a meagre viscous, a little butyric, or a little of each, and very much butyric, the last of which is most probable. The best original impregnation I ever had was obtained in the following manner: A pure culture of the lactic bacillus was obtained from the bacteria in a ferment tank and preserved. Previously sterilized milk was impregnated from this culture, and kept under pure culture conditions for a day, and then used with noticeable advantage over the spontaneously soured milk.

The impregnation accomplished in the saccharine solution, which should be neutral or faintly acid, not alkaline, the main process in the manufacture of lactic acid is begun. The success or failure in the manufacture depends wholly in the management of the fermentation. For economical production, over 90 per cent. of the glucose must be converted into lactic acid. Any unconverted glucose works a double injury, not only being a loss of material, but also making the resultant lactic acid liable to subsequent decompositions. In our factory to day we have practically no residue of undecomposed glucose, and the yield of lactic acid is over 98 per cent. As I have said before, the impregnation takes place at 45° or above, and from that point the temperature is allowed to decrease somewhat as the fermentation solution grows older. If it is desirable, as it usually is, to have the fermentation proceed briskly, the temperature must be higher than when, as is occasionally the case, it is desired to have a slow fermentation. It should be borne in mind, however, that a lactic fermentation of itself gives out considerable heat—the more so if quick running.

As the fermentation progresses, the solution must be neutralized with milk of lime, or chalk in suspension. The limits of acidity in which lactic bacteria are healthy are rigidly confined between 0·02 and 0·5 of 1 per cent. Keeping the acidity of the fermentation between these limits is the main preventive against butyric fermentation, as the regulating of the temperature is the preventive against alcoholic fermentation. If the fermenting solution is over-neutralized, the butyric ferment will at once begin to act, and, once active, is very difficult to control. It is the greatest enemy to the lactic fermentation, destroying the lactic acid that has been made, and devouring new quantities as fast as they can be produced. In twenty-four hours one-third of the lactic acid may be destroyed by the butyric bacillus. Anti-ferments cannot be used with much safety in lactic fermentation. The lactic bacillus is more susceptible than other ferments, and is killed while others are only stagnated. Mustard-seed oil is about the only exception that I know. This has apparently a deadening effect on butyric fermentation, with no serious effect on the lactic fermentation. The lactic fermentation is best completed in from three to six days, although its life may be prolonged up to a fortnight. Any prolongation of life is attended with danger of butyric invasion. When the fermentation is ended, the liquor must be heated sharply to kill all bacteria and spores and prevent subsequent fermentation.

The fermented liquor, which is now a solution of calcium lactate, with a multitude of dead lactic bacteria floating in it, is filtered and evaporated. If a pure lactic acid is desired, the calcium lactate is allowed to crystallize and purified by repeated crystallization. For a commercial lactic acid, decomposition by sulphuric acid of the dense uncrystallized solution of calcium lactate gives an acid of sufficient purity. The free acid obtained from this decomposition is further concentrated to such strength as the market demands. In evaporating free lactic acid there is danger of forming lactic anhydride. It is possible to have conditions such that the longer evaporation takes place the less percentage of lactic acid is obtained. In concentrated solutions very little lactic acid is lost by volatilization. In dilute solutions much acid may be mechanically carried away with steam, especially if a blast is used. A 50 per cent. solution is about as concentrated as it is economical to manufacture. This appears on the market as a syrupy liquid, with more or less brown color,

and a specific gravity of 1·20, and contains about 7 per cent. of lactic anhydride.

The applications of lactic acid to-day, while limited, are increasing. The majority of all that is produced is used by the woollen dyer as an assistant in mordanting with bichromate of potassium. For this purpose I believe it has advantages which the technical world is beginning to appreciate. Without discussing at length the comparative merits of tartaric, oxalic and lactic acids, I will just mention the advantages which are claimed for lactic acid, namely, greater reducing power, greater solubility of itself and its salts, and less corrosive action. The first claimed advantage, the greater reducing power of lactic acid toward chromium salts and chromic acid, is generally admitted in comparison with oxalic acid, and also in the case of tartaric acid, although the fact that tartaric acid reduces chromium salts more quickly has led to some discussion. Admitted that lactic acid has the greater reducing power, the value of this property in the dye-bath is not yet absolute, as with many coloring matters I do not find that the best results are obtained with the chromium reduced to its lowest terms. Yet, if lactic acid does the most economical reducing, it is but a question of correct proportioning of the recipe to obtain the desired shade at the lowest cost. The second and third advantages—greater solubility and less corrosive action—are unquestioned. In corroboration of my estimate of the value of lactic acid in the woollen industry, the following statistics of lactic acid are submitted. In 1894 the dye-houses of the United States and Canada used about 400,000 pounds of lactic acid, while none was used in England or Europe. In 1895 there was a domestic consumption of 1,000,000 pounds, and a foreign consumption of 500,000 pounds; in 1896 the domestic consumption was 1,200,000 pounds, and the foreign 1,000,000 pounds.

Lactic acid is used to a very limited extent in the calico-printing industry. Some discharge effects can be obtained advantageously with it. In most instances, however, the hygroscopic nature of the acid is injurious in its effect on colors which have to be steamed.

Next to the woollen industry, the most important application for lactic acid is in the preparation of hides for tanning. The efficiency of the bran drench for removing the lime from the skin, and making it porous and in good condition for receiving the tannage, is due to the lactic acid produced by the fermentation of the bran. A dilute

solution of lactic acid will do this work as well, and is much easier to control in its action. The slightly higher cost is more than compensated for by the prevention of waste. To the researches of Mr. Wood and Mr. Andreasch (F. Andreasch, *Der Gerber*, 21, 506; 22, 513) this application is attributable. In America over 300,000 pounds of lactic acid have been consumed, mainly by a few tanneries, during the last six months.

In the household lactic acid is used medicinally, and it is a substitute for other acids and fruit juices in making acid beverages. The large possible application of lactic acid for domestic use—the replacing of cream of tartar by the acid lactate of calcium—has not yet been put in practical operation.

With regard to the analysis of lactic acid, I feel I can add little to what Allen has collected in the latest volume of his Organic Analysis (A. H. Allen, Commercial Organic Analysis, Vol. III, Part III, 411, *et seq.*). On account of the solubility of all its salts, the direct determination of lactic acid is a long and delicate process. Generally the indirect method—determining total acidity and percentage of foreign acids—gives more expeditious results. There is not much sophistication of lactic acid. Sometimes acetic and mineral acids are found in it, and now and then samples of so-called lactic acid containing no lactic acid at all. Usually, however, commercial lactic acid is pure, except from products incident to manufacture and not deleterious in effect. The strength varies from 20 to 50 per cent., according to the price and for what purpose the acid is intended to be used.

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## ON A SOLUBLE COMPOUND OF HYDRASTINE WITH MONOCALCIUM PHOSPHATE.[1]

By T. H. Norton and H. E. Newman.

The following experiments were made in connection with an endeavor to enlarge the number of soluble salts of hydrastine, especial interest attaching to the combination of the alkaloid with a mineral salt of recognized value in medicine.

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[1] *Journal of the American Chemical Society*, October, 1897.

As is well known, but few salts of hydrastine are readily soluble in water. In our work we made use of monocalcium phosphate, which was carefully purified by prolonged washing with alcohol. A saturated solution of the salt in cold water was prepared by thorough trituration, the phosphate being in excess. On triturating this saturated solution with a large excess of pure hydrastine, a certain amount of the latter would enter into solution, time, as was eventually found, being an important factor. In order to ascertain the nature of the product obtained, the filtered solution was evaporated either by heat or spontaneously, or in a vacuum. In no case was it possible to detect any trace of crystallization. The solution invariably became syrupy, and finally left an amorphous residue quite similar to rosin in its appearance. This residue was soluble in about 10 parts of cold water. A small amount of boiling water would change it into a syrup. Both boiling and cold alcohol dissolved it easily and in about the same proportions. The melting point was 126°–128°. Although there was no criterion of the purity of the substance, it was submitted to analysis. No success followed an attempt to determine the amount of hydrastine present by the use of potassium permanganate, as no definite end reaction could be obtained. Resort was then had to incineration, care being taken to avoid unnecessarily high temperatures in the use of platinum dishes for the purpose. The substance dried *in vacuo* was heated to 105°. The very divergent results obtained showed that there was no fixed percentage of water held by the compound after desiccation *in vacuo.* The product of incineration was white, vitreous calcium metaphosphate.[2]

It was in all cases calculated to monocalcium orthophosphate, and the difference was assumed to be hydrastine. Analytical results soon showed that prolonged trituration was necessary to increase the amount of the alkaloid taken into combination by the phosphate. From $\frac{2}{10}$ to ½ gramme was used in each analysis of the substance dried at 105°. The following analytical data were obtained:

| No. | Time of Trituration. | Monocalcium Phosphate. Per cent. | Hydrastine. Per cent. |
|---|---|---|---|
| 1 | 10 minutes | 44·69 | 55·31 |
| 2 | 15 " | 38·33 | 61·67 |
| 3 | 5 " | 55·70 | 44·30 |

[2] Birnbaum: *Jsb. d. Chem.*, 1871, 281.

| No. | Time of Trituration. | Monocalcium Phosphate. Per cent. | Hydrastine. Per cent. |
|---|---|---|---|
| 4 | 3 minutes | 57·73 | 42·27 |
| 5 | 80 hours[3] | 29·00 | 71·00 |
| 6 | 80 " | 28·03 | 71·97 |
| 7 | 40 " | 31·00 | 69·00 |
| 8 | 50 " | 30·43 | 69·67 |
| 9 | 50 " | 28·10 | 71·90 |
| 10 | 6 weeks | 28·95 | 71·05 |

[3] In experiments 5 to 10 the alkaloid and the solution were placed in a corked bottle, and this was introduced into a box provided with paddles and suspended on an axis, which was kept in constant agitation beneath a water tap.

In order to appreciate these figures, let us note the theoretical percentages of the simpler possible combinations of monocalcium phosphate and hydrastine.

A.
$$2Ca(H_2PO_4)_2 \cdot C_{21}H_{21}NO_6.$$
$$Ca(H_2PO_4)_2 = 54{\cdot}10 \text{ per cent.}$$
$$C_{21}H_{21}NO_6 = 45{\cdot}90 \text{ per cent.}$$

B.
$$Ca(H_2PO_4)_2 \cdot C_{21}H_{21}NO_6.$$
$$Ca(H_2PO_4)_2 = 37{\cdot}9 \text{ per cent.}$$
$$C_{21}H_{21}NO_6 = 62{\cdot}1 \text{ per cent.}$$

C.
$$2Ca(H_2PO_4)_2 \cdot 3C_{21}H_{21}NO_6.$$
$$Ca(H_2PO_4)_2 = 28{\cdot}9 \text{ per cent.}$$
$$C_{21}H_{21}NO_6 = 71{\cdot}1 \text{ per cent.}$$

It will be seen at once that the apparent limit of the amount of hydrastine which can enter into combination with the phosphate, as shown by analyses 5 to 10, is practically identical with the percentage of the alkaloid present in the hypothetical salt C, where two molecules of monocalcium phosphate are in combination with three molecules of the alkaloid. In the picrate of hydrastine, one of the few crystalline derivatives, we encounter a combination of equal molecules [$C_6H_2(NO_2)_3OH \cdot C_{21}H_{21}NO_6$]; the amorphous sulphate and chloride ($C_{21}H_{21}NO_6 \cdot H_2SO_4$) correspond, however, to the formula B. While the formula C is unsupported by analogy and the aid of crystallization is lacking, the analytical data point strongly towards this as the correct expression for the product obtained by the method described.

# RECENT LITERATURE RELATING TO PHARMACY.

## THE PREPARATION OF HIGHLY PHOSPHORESCENT STRONTIUM SULPHIDE.

According to J. R. Mourelo (*Compt. Rend.*, **124**, 1024), the most satisfactory phosphorescent strontium sulphide is prepared as follows:

An intimate mixture of 285 grammes commercial strontium carbonate, 62 grammes flowers of sulphur, 4 grammes crystallized sodium carbonate, 2·5 grammes sodium chloride and 0·4 gramme bismuth subnitrate is placed in a crucible, covered with a layer of coarsely powdered starch, then submitted for five hours to a bright red heat and allowed to cool very slowly during ten or twelve hours. A white, friable mass is thus obtained, which develops a fine greenish-blue phosphorescence when exposed for about one second to daylight, and so intense as to be plainly visible in a shaded situation. The mixture becomes inert when powdered, but may usually be restored by re-ignition with starch.

## PARAFORMIC ALDEHYDE AS AN ANTISEPTIC.

Dr. B. H. Paul and A. J. Cownely (*Pharmaceutical Journal*, August 7, 1897), have conceived the idea that paraformaldehyde, which is a solid substance, volatilizable at about 100°, might be used as a more compact antiseptic than formaldehyde, since, by boiling with water, the para modification is converted into formaldehyde.

Since the latter in 40 per cent. solution is the only form that is possible commercially, there would be a considerable saving in transportation, both in volume and by using the para modification.

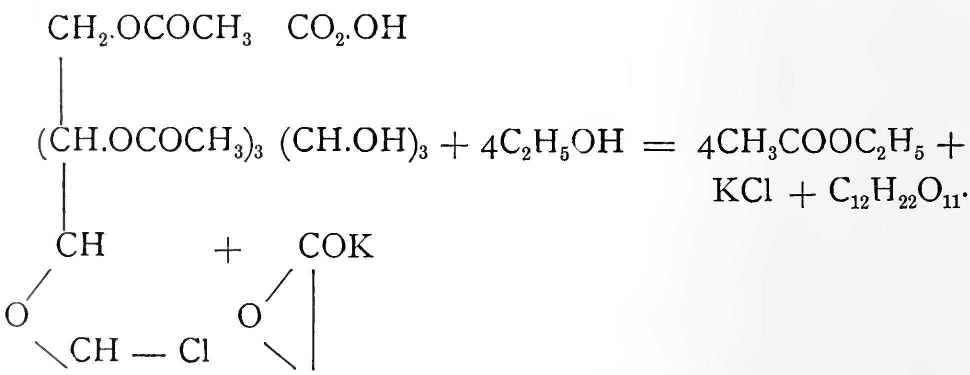
For comparative experiments the authors boiled the solid modification with water in the proportion of four to ten, connecting the flask to an inverted condenser. The conversion was effected in about two hours, as was also the case when the operation was conducted in a sealed tube. In both cases clear solutions were obtained with only traces of acidity. The products were assayed by the ammonium hydrate method and found satisfactory. The conclusions are that it is readily possible to convert the insoluble paraformaldehyde into its soluble modification, formaldehyde, and that it would seem to be more advantageous to produce paraformaldehyde than formaldehyde for commercial use, as the former is more readily manipulated and is easily rendered soluble to a suitable degree of

strength for antiseptic purposes when required. Indeed, where an antiseptic powder is required there is no reason why paraformaldehyde itself should not be of great service.

On exposure to air of an aqueous solution of formic aldehyde until it dries up, there appears to be formed not the true para compound but a mixture partaking to some extent of the characters of the substance $(CH_2O)_2$, described by Tollens and Mayer as being formed when formic aldehyde is evaporated over sulphuric acid. This substance was found to melt at about 131° C., and was more soluble in water than paraformaldehyde. The polymer produced by adding sulphuric acid to formic aldehyde had a much higher melting point, namely, 170° C. The variation of the melting point from 152° to 172° C., ascribed to paraformaldehyde is no doubt due to an admixture of these two bodies.

SYNTHESIS OF CANE SUGAR.

L. Marchlewski (Rocznik Akad. Umiej. Krakowskiej., 1896) has obtained cane sugar by the action of acetochlorhydrose upon the potassium salt of *d*-fructose. The reaction is expressed by the following equation:




Pure acetochlorhydrose is dissolved in alcohol, and to the solution freshly prepared potassium levulosate is added. The mixture is left to stand for about seven days at ordinary temperature; to complete the reaction it is heated for half an hour on a water bath; next, the potassium chloride formed is filtered off, the filtrate evaporated at 80° C., and the residue dissolved in boiling water. The solution obtained is next treated with a solution of calcium hydrate, and the gradually formed precipitate filtered off, stirred in some water, and decomposed with $CO_2$. The calcium carbonate is filtered off, and the filtrate purified by calcium hydrate in a similar manner. Finally,

the aqueous solution of the sugar is extracted with ether in order to remove the saccharin, and then evaporated *in vacuo*. After some days' standing the cane sugar formed, crystallizing in the well-known forms. All the reactions and physical properties agree with those of natural cane sugar.—*Jour. Soc. Chem. Industry*, July 31, 1897.

### RARE METALS IN NORTH CAROLINA.

In a recent circular of a North Carolina mining company, the claim is made that the future supply of some of the rare metals will come from that State.

*Monazite* yields 14 to 17 per cent. of cerium oxide, the metal being worth $2,880 a pound troy. There are in commerce no less than twenty-two preparations of cerium, of which the oxalate and nitrate are the most important medicinally.

*Gummite*, found in mica deposits, yields 50 per cent. uranium. The fused metal is worth 13½ cents a grain, or $768 a pound.

*Lithrophilite* and *amblygonite* contain from 9 to 10 per cent. lithium oxide. The demand for this metal has largely increased of late years, owing to the large consumption of lithia tablets.

### SURGICAL ANTISEPTICS AND DRESSINGS.

*Antiseptic Crayons.*—L. Adrian (*Nouveaux Remèdes*, **13**, 483) has proposed a number of formulas for surgical antiseptics. The following is a typical formula for an antiseptic crayon:

| | |
|---|---|
| Corrosive sublimate | 0·500 gramme |
| Powdered talc | 25·000 " |
| Gum tragacanth | 1.500 " |
| Distilled water | āā q. s. |
| Glycerin | |

For 10 crayons.

In place of the corrosive sublimate a number of medicinal substances may be used as antiseptics, as boric acid, iodoform, phenol, salol, iodol, ichthyol, etc. Astringent and antiseptic crayons are prepared by using tannin, alum, antipyrine, ergotine or ferric chloride. Resolvent crayons are made with potassium iodide, and sedative crayons with belladonna, morphine, cocaine, etc.

Starch, dextrin or sugar may be employed to replace part of the tragacanth.

*Laminaires antiseptiques.*—The dried pieces of the stems of Laminaria digitata are employed in place of sponge tents. The laminaria

are solid, black in color, and the size of a goose-quill, and on coming in contact with the liquids of the economy, evenly swell to six times their volume. Before introduction into the cavity the surface is roughened by a grater or file, and they are then plunged for some minutes in tepid water. They may be preserved in one of the following solutions:

| | | |
|---|---|---|
| *a.* | Corrosive sublimate | 1 part. |
| | Absolute alcohol | 100 parts. |
| *b.* | Corrosive sublimate | 1 part. |
| | Ether | 100 parts. |
| *c.* | Iodoform | 10 parts. |
| | Ether | 100 parts. |

*Antiseptic powders* are made with an inert base, and such substances as sulphocarbolate of zinc, iodoform, phenol, corrosive sublimate, salol, etc.

The following is the formula of the powder of Lucas Championniere.

| | Grammes. |
|---|---|
| Iodoform, finely powdered } ā ā | 930 |
| Benzoin " " } | |
| Quinine " " | 960 |
| Magnesium carbonate, finely powdered | 930 |
| Oil of eucalyptus | 120 |

This powder has a great reputation for indolent ulcers, and particularly with sores of the sacrum.

Kümmel has recommended common sand as a basis for antiseptic powders. White sand is sieved and heated to redness, whereby it is thoroughly sterilized; it is then incorporated with corrosive sublimate, phenol, iodoform, etc., in the proportion of 5 to 10 per cent.

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*Cloves and Caffeine in France.*—At the last meeting of the Paris Syndical Chamber of Chemical Products, M. Adrian mentioned that the excise authorities had given distillers facilities for preparing oil of cloves, which were formerly not permitted. The cloves are admitted duty free, and, after having been used for preparing the oil, are burnt in the presence of an excise officer. M. Adrian thinks the same favor might be accorded to chemists for the preparation of certain alkaloids, and he especially referred to caffeine as being one of the most important on account of its increased use.—*The Chemist and Druggist*, October 9, 1897.

# EDITORIAL.

The following circular letter has been received from the Department of Agriculture:

UNITED STATES DEPARTMENT OF AGRICULTURE,

DIVISION OF CHEMISTRY.

WASHINGTON, D. C., September 17, 1897.

DEAR SIR:—Under authority of Congress, the Department of Agriculture is investigating the extent and character of food and drug adulterations, and is desirous of securing all the information possible on the subject. Having been appointed special agent to inquire into and report upon this matter, the undersigned writes to request that you kindly furnish the Department all the information you have in regard to adulterations, together with any suggestions as to the best remedy for the evil.

(1) Do you know of any new adulterant? If yes, state what, and how used; (2) Would a national food and drug law assist in preventing adulteration? (3) Would uniform food, drug and pharmaceutical laws tend to promote efficiency and purity? (4) Please suggest what would best promote the interests of consumers and legitimate manufacturers and dealers; (5) What is your opinion as to the extent of damage done legitimate business by imitation of brands, packages, etc.? (6) To what extent do sophistication, misbranding and injurious adulteration exist? (7) Have State laws aided in preventing adulteration? To what extent? (8) Would a national law assist State officials in properly executing the local laws? (9) Have adulteration, sophistication and misbranding increased or decreased? Prompt replies to the above, together with any other information or suggestions, will be highly appreciated.

Yours respectfully,

A. J. WEDDERBURN,
*Special Agent.*

Approved:
JAMES WILSON,
*Secretary.*

We confess to an inability to answer some of these questions. An affirmative reply to 2 and 3 and a correct solution of 4 would leave nothing in the way of worldly success and happiness, but the indifference of Congress and the neglect of that body to pass the necessary laws. No. 7 we would respectfully refer to the people of the State of Ohio.

We predict that answers to *all* the queries in the letter will come in slowly, but it is possible that they may lead to the compilation of a new set of questions not quite so comprehensive. Certainly the Department of Agriculture can do no better work than collect information on the extent and character of food and drug adulteration, and individuals may feel that they are doing a public service in writing to the special agent, answering the questions, as far as possible, and in making suggestions as he requests.

# REVIEWS AND BIBLIOGRAPHICAL NOTICES.

Missouri Botanical Garden. Eighth Annual Report. William Trelease, Director. St. Louis, Mo. 1897. Pp. 236.

The Report for the year 1896 contains: Report of the Officers of the Board; Eighth Annual Report of the Director; Scientific Papers; Library Contributions. The report of the Director is always interesting, but this year it is made additionally so by short accounts of the disastrous storms which visited the Gardens on May 21st and 27th; the former being especially destructive on account of the accompanying hail, and the latter being cyclonic in character. "While the grounds were not traversed by the cyclonic funnel, but were exposed only to the strong northwest gale which accompanied it, the violence of the wind was such that a number of the structures on the grounds were either unroofed or totally wrecked, while some 450 trees, many of them of large size, were wholly or practically destroyed, and a large percentage of those left standing were seriously broken. A more graphic view of the destruction of the trees may be obtained from the statement that 186 cords of firewood have been prepared from the more workable trunks and larger branches of the trees removed." It was found necessary to expend over $4,000 in such storm repairs as could be made, and the loss in specimen plants cannot be expressed in money.

The herbarium, during the period of time covered by this report, has increased from 159,046 unmounted specimens to 258,629 mounted specimens, protected by impregnation with corrosive sublimate.

The scientific papers, which occupy the bulk of the volume are: "The Mosses of the Azores," by J. Cordot; "On Some Mosses Collected in Madeira," by William Trelease; "Botanical Observations on the Azores," by William Trelease. The last is very interesting, includes a catalogue of the plants occurring in the Azores, and is illustrated by fifty-five full-page plates. The other portions of the book are beautifully illustrated.

Proceedings of the Nineteenth Annual Meeting of the Missouri Pharmaceutical Association, June 8-12, 1897.

This is one of the first reports of this year's State meetings to reach us. It contains a number of good original papers, among them one by G.H. Charles Klie, on "A So-called Tasteless Quinine." He has done considerable work in exposing the fraud of the substitution of calcium sulphate for quinine sulphate, under the name of "Flora-China." This substance was first shown at the Montreal meeting of the American Pharmaceutical Association in 1896; but notwithstanding the publicity given to it there, it has continued to flourish in the Southern States. Mr. Klie traced its origin to Hankins Mook Company, Live Oak, Fla.

Annual Report of the Clerk of Forestry for the Province of Ontario, 1897. Thomas Southworth, Clerk.

The following are the chief subjects discussed in this interesting volume: "The Crown Lands Forestry Problem;" "Forestry on the Farm;" "Nature Study in the School;" "Entomology;" "The Manufacture of Wood Charcoal."

REPORT OF THE BOARD OF MANAGERS OF THE PENNSYLVANIA HOSPITAL TO THE CONTRIBUTORS. Philadelphia, 1897.

The report of a charity which has existed and flourished for a century and a half is a matter that should attract attention, and a careful perusal of it will convince one that this time-honored institution is one to be proud of. The volume is elaborately illustrated with interior and exterior views of the buildings.

EARLY AMERICAN CHEMICAL SOCIETIES. By H. Carrington Bolton, Ph.D. Reprint from the *Journal of the American Chemical Society*, August, 1897.

The author makes out a very interesting historical account of the early efforts of chemists to associate for mutual benefit. The Chemical Society of London, the oldest in Europe, was founded in 1841, forty-nine years after the first American society. The early American societies are summarized as follows:

I. The Chemical Society of Philadelphia, founded in 1792.

II. The Columbian Chemical Society of Philadelphia, founded in 1811.

III. The Delaware Chemical and Geological Society, founded in 1821.

The account of the active workers in these societies constitutes the main body of the paper.

UEBER FLECHTENSTOFFE, von O. Hesse. Reprint from *Berichte der Deutschen Chemischen Gesellschaft*, 30, 1893.

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## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, October 19, 1897.

The first of the series of pharmaceutical meetings for 1897-98 was held in the College Museum, with J. W. England in the chair. The reading of the minutes of the last regular meeting was omitted and they were allowed to stand as published.

The chairman then called for the presentation of specimens. Dr. C. B. Lowe showed some extraordinarily fine samples of asafetida which he had procured from the Smith, Kline & French Company, of this city, they having received it in original packages from Bombay, through London. He also showed some samples of Japanese persimmons from Florida, where they are grown to a considerable extent by grafting the wild variety. Prof. Trimble presented, on behalf of Mr. Charles Bullock, quite a collection of minerals and ores for the cabinet of the College. The chairman showed a colchicum plant which had been placed in alcohol while in bloom and which also was intended for the cabinet. Prof. Trimble moved that a vote of thanks be extended Mr. Bullock for his valuable donation, and it was so ordered.

The reading and discussion of papers next occupied the attention of the meeting, and the first one presented was on "An Examination of Some Official Lead Preparations," by F. W. Haussmann.

This paper gave evidence of much careful and thoughtful work on the part of the author, and the criticisms and suggestions contained therein were of an

eminently practical and useful kind. The chairman spoke in complimentary terms of the paper, and said that suggestions whereby rapid methods could be adopted were of great value to the pharmacist.

Prof. Remington said that detailed methods, such as Mr. Haussmann described, were very valuable to the Committee on Revision of the Pharmacopœia, and that he had done pharmacy a distinct service by this work.

"International Congresses" was the subject of a paper by Prof. J. P. Remington. The author took a comprehensive view of the question of international gatherings, and while he portrayed the ideal congress, he did not lose sight of the real difficulties which attend all such undertakings. He believed in considering conditions as they actually exist, and that by so doing, many of the hindrances which retard the successful issue of international scientific gatherings could be eliminated.

A paper entitled "Balsam Copaiba, Oil of Copaiba, Mass Copaiba, Resin Copaiba and Gurjun Balsam" was presented by Lyman F. Kebler.

This paper embodied the results of an examination of a number of samples of the above substances. The author said that on account of the number of varieties of copaiba and the unknown composition of them, their qualitative analysis was attended with difficulty. The data presented by him was therefore intended to supply this deficiency.

In discussing the active constituents of copaiba, Dr. Lowe said that there seemed to be some misapprehension among physicians as to the particular effect of each of these. He said that the volatile oil has a stimulating action, while the acid resin is a diuretic.

The last paper on the programme was presented by the chairman, J. W. England, and was on the question, "Shall Distilled and Fermented Liquors be Dismissed from the U. S. Pharmacopœia?"

Notwithstanding the interpretation placed by many upon the attitude of the Government on the subject of alcoholic liquids, the author believed that the above question had no bearing upon the saloon question. He looked upon these liquids as drugs, and urged retaining them in the Pharmacopœia and demanding them of a certain quality.

His remarks occasioned considerable applause, and the subject was freely discussed by the members present.

Wm. B. Thompson was in favor of dismissing whiskey from the Pharmacopœia since it entered into no official preparation. He furthermore believed that the official wines would serve their purpose as well if made with alcohol of the required strength.

Dr. Lowe was of the opinion that alcohol was the only therapeutic constituent of these liquids, but that the bouquet made them more palatable, which was an argument for retaining them.

C. Carroll Meyer, referring to the sale of liquor in stores, believed that druggists were honorable in this respect, and that very few of them sold it, except in Prohibition States, without the physician's order.

Mr. Kebler took the negative side of this question, and said that he had examined samples of wine and found many which were adulterated and others which were artificial products colored with aniline dyes. He believed that many victims of the alcohol habit were attracted by the so-called bouquet who might not otherwise have persisted in the habit.

# MINUTES OF MEETING OF MEMBERS OF THE COLLEGE.

The stated quarterly meeting of the members of the College was held September 27th, at 4 o'clock P.M., Vice-president Jenks presiding. Minute of previous stated meeting read and adopted. Minutes of meetings of the Board of Trustees for July and September presented and approved. The secretary referred to the subject of a proposed uniform pharmacy law for the States, concerning which this College was requested to send a form or draft to the Chairman of the Section on Education and Legislation of the American Pharmaceutical Association. The consideration of the subject having been postponed for the want of sufficient time, it was again resolved to defer action until some more definite progress or report should be made by the Committee of the Association. In obedience to the direction given the secretary, there was presented and read the opinion of the legal counsellors of the College, upon the purpose contained in the interrogatories submitted by Mr. Boring at the June meeting. These questions involved the constitutionality of certain proposed by-laws which were contemplated as an amendment to the existing code. On motion, it was resolved to receive and file this report. Mr. Boring objected to this method of disposing of the subject of this report, and desired that the matter should be discussed at the present meeting. Whereupon Mr. Beringer moved, and the motion was carried, that the chairman should appoint a committee of five members who should consider the propositions, and report upon the same at the next stated meeting. The chairman named Messrs. Beringer, Boring, Stedem, Weidemann and Cliffe as members of this committee. Prof. Sadtler reported, verbally, at length, on behalf of the delegates of the college to the sessions of the American Pharmaceutical Association upon the proceedings of that body at the recent meeting in August. The terms of Messrs. Krewson, Weidemann and Kline, as trustees, expiring with this date, and these gentlemen being re-nominated without opposition, the secretary was instructed to cast an affirmative ballot, which, being done, all were declared to be elected. The decease of Prof. Bastin creating a vacancy in the Board of Trustees, nominations for this position were called for. Upon the nominations being made, and the votes of candidates recorded, the tellers announced that Mr. C. Carroll Meyer had received the highest number and was therefore duly elected.

The meeting, on motion, adjourned.

WILLIAM B. THOMPSON, *Secretary.*

# NOTES AND NEWS.

*Tribuna Farmacéutica* is the name of a new pharmaceutical journal in Buenos Ayres. It is the organ of the *Circulo Farmaceutico Argentino.* The publishing committee consists of José Bonauni, Dr. Estanislao Zubieta, Victor B. Molina, Bernardo Nespral and Lino Viñas Loureiro.

The first two numbers of eight pages each are made up partly of matters relating to members and of professional interest, and contain original articles on the estimation of tannin, on some incompatibilities and on the rapid and economic preparation of hydrogen peroxide.

This new journal bids fair to publish considerable original matter.

*The Cinnamomums of New South Wales.*—A paper was read at the July meeting of the Linnean Society by R. T. Baker, assistant curator Technical Museum, on the Cinnamomums of New South Wales, with a special research on the oil of C. Oliveri, Bailey.

The genus Cinnamomum, hitherto unrecorded for New South Wales, is now shown to occur over a large area of the coastal district, being represented by two species, C. Oliveri, Bailey, C. virens, sp. nov. The former species has in the past been mistaken in the northern colony for Beilshmiedia obtusifolia, and has only recently been identified as a Cinnamomum; very probably the same confusion of species has occurred in this colony. C. virens appears to stand somewhat alone, its affinities with known species not being very marked. Descriptions of the timber, gall-fungus, bark and oil are given. The oil obtained from C. Oliveri is highly aromatic, and is found to contain cinnamic aldehyde, eugenol, together with other constituents. The bark gave nearly one per cent of oil. It is hoped that a new commercial product may result from these investigations.—*The Pharmaceutical Journal of Australasia*, August 28, 1897.

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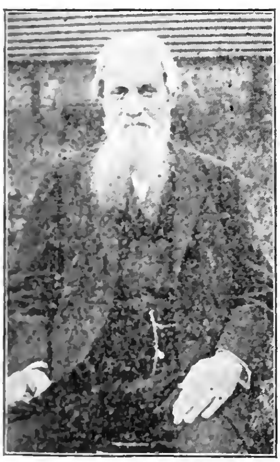
## OBITUARY.

*Athanase Roidot*, who for forty-nine years conducted a drug store in the vicinity of Eighth and Vine Streets, this city, died on October 9th, at his residence, 905 Buttonwood Street. He was born nearly eighty years ago, in France, and came to this country at an early age.



He learned the drug business in his native country, and when he came to this city he entered the employ of Elias Durand, who at that time had a store at the northwest corner of Sixth and Chestnut Streets. Mr. Roidot was elected a member of the Philadelphia College of Pharmacy in 1852.

*Peter Lund Simmonds*, whose portrait we present with this sketch, died in the Charterhouse, London, October 3d, in the eighty-third year of his age.

The deceased was formerly well known as a writer on applied science and as having taken an active part in the management of several of the large international exhibitions. He was born at Aarhuus, Denmark, in 1814, but spent most of his life in England. He was an extensive writer on agricultural and food topics and commercial matters in general, including the subject of drugs, and was not an infrequent contributor to this JOURNAL. He was proprietor and editor of the *Technologist*, 1862-66, and the *Journal of Applied Science*, 1870-81. Of his other published works the following may be mentioned: "The Commercial Products of the Vegetable Kingdom," "Waste Products and Undeveloped Substances," "Waste Products, A New and Enlarged Edition," "Tropical Agriculture, New and Enlarged Edition," and "A Hand-book of British Commerce."

Mr. Simmonds had, at different times during his life, been elected to membership in various literary and technical societies, including several representative agricultural societies and the Society of Arts, London, and in 1896 was elected an honorary member of the Philadelphia College of Pharmacy.

QUERCUS PHELLOS, L.—WILLOW OAK.

// THE AMERICAN
JOURNAL OF PHARMACY.

*DECEMBER, 1897.*

# THE WILLOW OAK.

By Henry Trimble.

One of the most interesting of the oaks in this vicinity is the Quercus Phellos, L., or willow oak. While it is not of great value from an economic standpoint, it nevertheless affords the means of profitable study by the botanist. The casual observer, if he did not notice the tiny acorns, would pronounce it a willow tree, and its resemblance to the latter, especially in the matter of foliage, is very striking. It has, therefore, always been regarded with curiosity, and judging from the correspondence of Peter Collinson and John Bartram, it is evident, from the appeals of the former for specimens, that it was especially a botanical curiosity in London over a century ago.

About thirty-five years ago the late Professor Procter visited, with S. B. Buckley, a grove of willow oaks near Mount Holly, N. J., for the purpose of identifying one among them which showed some variations in foliage. Mr. Buckley contributed a paper on this oak to the Academy of Natural Sciences and published it with additions in the American Journal of Pharmacy, for March, 1862. Evidently these two men decided that the peculiar member of the group was Bartram's oak, Quercus heterophylla, Michx., and that it was merely a variety of the willow oak and not a hybrid. It may be said that this opinion is held by many at the present day, although, according to Sargent, it is a hybrid of the willow oak with Quercus velutina, and Britton and Brown state that it is probably a hybrid of the

willow oak with Q. rubra. Gray gives the combination as Q. Phellos with Q. rubra or coccinea.

Some pertinent remarks on "Hybrids in Nature," by Thomas Meehan, have recently appeared in the *Proceedings of the Academy of Natural Sciences of Philadelphia* (1897, p. 194), in which, using the oaks as an illustration, he shows that hybridization will not account for the variations in this genus.

The willow oak is found along the coast of the Eastern United States, from Long Island, New York, southward to Florida, and thence westward to Missouri and Texas. It prefers low, moist ground, and is quite common in the lowlands on both sides of the Delaware River, south of Philadelphia. It has also become more common of late years by cultivation as an ornamental tree.

In this latitude it is a rather small tree, rarely exceeding a height of 40 to 50 feet, but further south it attains a maximum of 80 feet, and a diameter of 3 feet.

The accompanying illustration shows the peculiar character of the foliage, which is rather densely crowded at the ends of the branches. Nearly all the illustrations of the acorns which are figured in books on the subject are far from being true representations. Sargent's "North American Silva" is, however, a notable exception in this respect. In the present instance the illustration, being a photographic reproduction, differs from the natural object only by a slight reduction in size.

As stated at the beginning of this paper, the willow oak has not attained any great economic value, and most writers give it a poor name. No less an authority, however, than Dr. Charles Mohr, of Mobile, Ala., says the wood is hard, very elastic, compact, and suitable for railway carriages and many other purposes.

It is hoped that, ere long, something will be forthcoming from the Chemical Laboratory of the College, on the composition of the bark, which has been under investigation for some time. So far as the tannin is concerned, the bark does not appear to be sufficiently rich to warrant its use in the manufacture of leather.

For the photograph from which the illustration was made I am indebted to my friend, Dr. Charles Schäffer.

# LABORATORY NOTES.

BY CHARLES H. LAWALL.

The question of stability in pharmaceutical preparations is one which has received comparatively little consideration. A process for making a tincture or a fluid extract is considered satisfactory when little or no precipitation takes place after standing for some time.

The methods for alkaloidal assaying, which are in use at the present time, are of such recent origin that very few data have been recorded as to the stability of such preparations as may be assayed.

In a few years such facts as these will have been published and a better knowledge will have been obtained regarding the character of the precipitate which forms in many fluid extracts and tinctures.

In the case of fluid extract of ipecac, the author has an opportunity of recording the alkaloidal assay of a sample which was made by the late Prof. John M. Maisch while he was in charge of the Government hospital laboratories during the Rebellion.

No knowledge can be obtained as to the alkaloidal strength of the preparation as originally made, or the quality of the drug which was used in manufacturing it; but, in view of the fact that it assays considerably above the standard after a lapse of more than thirty years, it is safe to conclude that fluid extract of ipecac, as made by the process in use at that time, is a stable preparation.

The process described in the 1860 Pharmacopœia, by which this preparation was no doubt made, is essentially as follows :

Sixteen troy ounces of powdered ipecac are exhausted by percolation with alcohol, and the alcohol is distilled off until a syrupy liquid remains ; this is mixed with 1 fluid ounce of acetic acid and 10 fluid ounces of water, and boiled gently until it is reduced to 8 fluid ounces (this separates resinous matter) ; the liquid is then filtered and made up to 8 fluid ounces in volume by the addition of water, after which it is mixed with 8 fluid ounces of alcohol.

In the 1890 Pharmacopœia the process is very different. 1,000 grammes of powdered ipecac are percolated with a menstruum consisting of 3 parts of alcohol to 1 part of water ; 1,000 c.c. of fluid extract are made. This is a different drug strength in the finished preparation. The 1860 preparation has about 1,055 grammes of drug to each 1,000 c.c., the alcoholic strengths of the menstrua differ, and the present official process dispenses with the

acetic acid, as formerly used. These differences indicate that it would not be wise to conclude that a preparation made by the present officinal process would keep as well as the one recorded here.

The preparation is of undoubted authenticity, and was obtained through the kindness of Mr. Frederick Sher, of the Smith, Kline & French Company, in whose possession it has been for many years.

It bears a label stating that it was "prepared at the U. S. A. Laboratory, Philadelphia, Pa., 1864." The bottle has the words: "U. S. A. Hosp. Dept.," blown in the glass, which is of a very deep blue color. The bottle had been so carefully sealed that no apparent evaporation of the liquid had taken place when it was received by the author. It has a pleasant acetic odor and strong characteristic taste, and the sides of the bottle are covered with a resinous deposit, the quantity of which could not be determined.

For the assay, a sample was carefully decanted so as to avoid transferring any precipitate which might contain the alkaloids. The process of Keller was followed, titrating the varnish-like residue by means of decinormal sulphuric acid and centinormal potassium hydrate, using hæmatoxylin as indicator. The alkaloidal strength was 2·76 per cent., calculated as emetine. As 2·00 per cent. is the present standard adopted by manufacturers who assay this preparation, it has lost little or no alkaloid after a period of thirty-three years. It speaks well for the quality of the drug, and the thoroughness of the manipulation used, and would compare favorably with our present day products, made by so-called improved apparatus and perfected methods.

*Japan Wax.*—In the AMERICAN JOURNAL OF PHARMACY for January, 1897, the author published an article on the extensive adulteration of Japan wax with starch. Since that time more than 300 cases of Japan wax (aggregating 60,000 pounds) have been examined, all of which complied with the requirements of a normal product. The melting point ranged from 50° to 54° C.; the specific gravity from 0·965 to 0·984; the acid number from 17·98 to 20·45, and the saponification value from 217·93 to 224·86.

In physical characters there was a slight variation; some of the samples seemed to be more greasy than others, this being noticeable either by pressing the wax between the fingers or by masticating a small portion. Such a slight difference, however, might be

due to variations in the age of the product or in the methods of preparing it for the market.

*Mercurial Ointment.*—A number of samples of mercurial ointment, made by reputable manufacturers, were examined. The percentage of metallic mercury was found, in every case, to approximately agree with the amount claimed upon the label.

*Calcium Phosphate Precipitated.*—Several large consignments of this substance were found to contain a great quantity of carbonates. In one case the amount of calcium carbonate present reached 40 per cent.

The use of such a product in the manufacture of tincture of opium by the formula in the 1890 Pharmacopœia would result in the retention of the morphine and the consequent worthlessness of the preparation. An unsuspecting druggist, using it in this manner, might render himself liable to prosecution for dispensing tincture of opium below the legal standard, or the dispensing of such an inert preparation upon a prescription might contribute to the death of a patient.

The occurrence of such products, which eventually find their way into the market, emphasizes the necessity for that personal examination of goods which it is the duty of each druggist to make. Honest manufacturers have nothing to fear from this, while those who are in the habit of furnishing inferior goods would either be compelled to raise their standard or go out of business.

*Beeswax.*—The record of the samples of beeswax examined during the present year was very unfavorable, notwithstanding the number of reputable dealers who are interested in the purification and sale of this product.

Sixteen (16) samples were examined. Of these but seven (7) answered all of the requirements of a pure wax; five (5) contained small quantities of stearic acid, indicated by an acid number of about 25·00 and verified by Fehling's test; one (1) contained a larger amount of stearic acid (acid number, 46·92), and three (3) contained paraffin in varying quantities, the acid numbers ranging from 4·53 to 12·55.

Those samples which contained paraffin were of a suspicious appearance and feel, but the presence of such small quantities of stearic acid as indicated by an acid number of 25, does not materially alter the appearance of the wax, while it totally unfits it for

some purposes, among which may be mentioned its use in lithographic work.

Such a slight contamination should be looked upon as accidental, rather than wilful adulteration, and those who buy the wax from the producer should carefully examine it before refining, as it is possible for it to have its origin in a manner which is very well known to those who are acquainted with the details of apiculture, namely, in the use of artificial comb foundation, which is purchased by many bee-keepers to save part of the labor of the colony and insure regularity in the building of the comb.

Contaminations originating in this manner are frequent, and the blame rests upon the manufacturer of the artificial comb foundation.

305 Cherry Street, Philadelphia.

## THE YELLOW COLORING PRINCIPLES OF VARIOUS TANNIN MATTERS.[1]

By A. G. Perkin.

The author continues his investigation of tanning materials, with the object of studying the yellow coloring principle which is so often found associated with the tannin in plants, and also for the purpose of determining the relationship between the coloring matter and tannin, by the character of their decomposition products.

Cape sumach, Colpoon compressum, was first examined. The leaves (which constitute the part utilized), roughly broken, were extracted in a Soxhlet's apparatus, first with ether to remove wax and chlorophyll, and then with alcohol, which dissolved both coloring matter and tannin. The alcoholic extract, after being evaporated to a small bulk, was poured into water, and the mixture extracted with ether. The aqueous liquid was freed from the small amount of alcohol remaining by distillation, and on cooling became semisolid, owing to the production of crystals. These were collected and washed with ether, chloroform, and dilute alcohol until the washings were colorless. The yellow product obtained was further purified by crystallizations from dilute alcohol and a final crystallization from boiling water.

Experiments showed this substance to be a glucoside, which, on decomposition with dilute sulphuric acid, yielded a yellow coloring

[1] Abstracted from the *Journal of the Chemical Society*, London, October, 1897.

principle as one of the products. The acetyl derivative of this crystallized from alcohol in colorless needles melting at 189° to 191°. By fusion with alkali two crystalline decomposition products, namely, phloroglucinol and protocatechuic acid, were obtained. These properties, together with an examination of its dyeing and other properties, clearly showed the coloring principle resulting from the decomposition of the foregoing glucoside to be quercetin.

To ascertain the nature of the sugar liberated in the above action, the osazone derivative was prepared. This consisted of glistening yellow needles melting at 205°, and was apparently *dextrosazone*.

Of the three distinct glucosides of quercetin which have been described, the one under consideration was found to resemble viola-quercitrin, in that it yielded quercetin and glucose on decomposition. The author proved, however, that they were not identical, and proposed to name the substance obtained by him *Osyritin* from Osyris compressa, another name for Cape sumach.

The tannin obtained from the filtrate, from which the osyritin had been separated, was examined to determine its general characters. It was found to be a tannin glucoside, and to closely resemble quinotannic acid and quinovatannic acid, which are decomposed by acid into a sugar and an anhydride, and yield protocatechuic acid on fusion with alkali.

A study was made of the coloring principles of the two varieties of commercial catechu, namely, gambier and acacia catechus. The identity of the coloring principle of the former variety with quercitin, as reported by Löwe (*Zeit. anal. Chem.*, 1874, **12**, 127), was confirmed, and while the properties of the principle from the latter variety indicated that it was also identical, it was not obtained in sufficient quantity for ultimate analysis, 400 grammes of catechu yielding only 0·05 grammes of coloring matter.

Rhus cotinus, the Venetian variety of sumach, next received attention, and the coloring principle, determined to be myricetin instead of quercetin, as reported by Löwe. It yielded, with dilute alkalies, a deep green solution, and its acetyl derivative crystallized in colorless needles, melting at 203°–204°. Owing to the excessive adulteration which is practised with this product, the author does not consider his results in this case as final, but, nevertheless, regards them as extremely suggestive.

Of other tannin matters, the following fruits and seeds were ex-

amined: "Valonia," the acorn of Quercus ægilops; "Dividivi," the seed pods of Cæsalpinia coriaria; "Myrabolans," the unripe fruit of Terminalia chebula; "Algarobilla," the seed pods of Cæsalpinia brevifolia; pomegranate rind, Punica granatum; and gall nuts, Quercus infectoria. An exhaustive investigation of these products by numerous methods showed that they contained no member of the quercetin or allied series, but all were found to depend, either directly or indirectly, upon ellagic acid alone for their dyeing properties. They are all very similar in this respect. Experiments were made with woollen cloth mordanted with chromium, aluminum, tin and iron. For the sake of comparison, some of the results were tabulated, as follows:

| | Chromium. | Aluminum. | Tin. | Iron. |
|---|---|---|---|---|
| Ellagic acid . . . | Pale green-olive-yellow | Pale olive-yellow | Scarcely dyed | Somewhat olive-gray-black |
| Valonia nuts . . . | Green-olive-yellow | Faint olive | Scarcely dyed | Weak gray-black |
| Pomegranate rind | Yellow-olive | Faint olive | Scarcely dyed | Weak bluish-gray-black |
| Gall nuts . . . . . | Green-olive | Faint olive | Scarcely dyed | Purplish-black |

The following table was presented to show the intimate connection between the coloring principles and the tannin matters in the plants examined, for, on decomposition, the same acid, and, in some cases, the same phenol was obtained from both:

| | Tannin. | Decomposition Products of Tannin. | Coloring Matter. | Decomposition Products of Coloring Matter. |
|---|---|---|---|---|
| Quebracho Colorado . . . . . . | Quebrachotannic acid | Phloroglucinol and protocatechuic acid | Fisetin | Resorcinol and protocatechuic acid |
| Rhus coriaria . . } Rhus cotinus . . } | Gallotannic acid | Gallic acid | Myricetin quercetin | Phloroglucinol and gallic acid |
| Gambier Catechu } Acacia Catechu } | Catechin | Phloroglucinol and protocatechuic acid | Myricetin quercetin | Phloroglucinol and protocatechuic acid |
| Acacia catechu . . | Catechin | — | — | — |
| Colpoon compressum . . . . . . . | A catechol tannin | Protocatechuic acid | Quercetin | Phloroglucinol and protocatechuic acid |
| Dividivi, etc. . . . | Ellagitannic acid | — | Ellagic acid | — |

# THE VEGETATION OF THE YELLOWSTONE HOT SPRINGS.

By John W. Harshberger, Ph.D.

The actual discovery of the Yellowstone Wonderland, by which is meant its full and final disclosure to the world, was the work of three parties, who visited and explored it in the years 1869, 1870 and 1871. Although, since the last date, much has been written concerning the geological and physiographical features of the park set aside by Act of Congress in the year 1872, little has been written concerning the flora of the region, and what has been published deals almost entirely with the plants from a systematic standpoint.

Situated in the northwestern corner of Wyoming, in the Rocky Mountains, at an elevation ranging from 6,000 to 12,000 feet, the region is one of high and lofty mountains, of deep cañons walled in by precipitous sides, and of beautiful upland valleys, the natural haunts of the timid herbivora that seek the mountain meadows for the tender and nutritious grasses which grow there luxuriantly. The pasturage in many of the meadows and valleys is excellent, being formed by the growth of such grasses as alpine timothy, *Phleum alpinum*, blue joint, *Calamagrostis Canadensis*, sheep's fescue, *Festuca ovina*, Kœleria, *Kœleria cristata*. The herbaceous vegetation is not so striking as in many other regions, but still the distribution of such species as do occur is interesting. In the lakes and rivers we find the aquatic vegetation to consist of *Ranunculus aquatilis*, *Nuphar advena*, *Nuphar polycephalum*, *Utricularia vulgaris*, *Lemna trisulca*, *Typha latifolia*, *Sparganium simplex*, etc. Near the head of Yellowstone Lake is found *Subularia aquatica*, a plant of quite a remarkable distribution, found nowhere else in America except in Maine and New Hampshire. *Gentiana detonsa*, *Spraguea umbellata* are striking plants. The meadows and hillsides are spangled with bright-colored flowers, among which may be noted the bee larkspur, *Delphinium Menziesii*, the columbine, *Aquilegia flavescens*, the harebell, *Campanula*, the aconite, *Aconitum Columbianum*, the lupine, *Lupinus*, the evening primrose, *Œnothera*, the aster, the painted cup, *Castilleia*. It is a remarkable fact that scarcely a night passes throughout the summer without frost, so that the herbaceous plants grow and bloom under somewhat unusual conditions. The fringed gentian, *Gentiana detonsa*, closes its flowers as night approaches, to open them again in the morning, and many other plants provided

with a hairy or woolly covering are thus secure against frost action. The plants of the Yellowstone region, as far as observed, are well adapted to their surroundings.

The forests are formed by one tree predominating, *Pinus contorta, var. Murrayana*, which grows tall and straight, but never reaches any considerable girth. Interspersed among the pines we find several other arborescent species, namely, Douglass spruce, *Pseudotsuga Douglasii*, the largest tree in the park; balsam, *Abies subalpina*, pine, *Pinus Engelmannii*, red cedar, *Juniperus Virginiana*, poplar, *Populus tremuloides*, and willow, *Salix*, of several species. These forests are of great importance in conserving the rain which falls. Many of the most important rivers of the western United States rise in this region, the Missouri, the Yellowstone, the Wind, the Big Horn, the Platte, the Green (afterward the Colorado), and the Snake, which flows through Wyoming, Idaho and Washington, emptying into the Columbia, and thus reaches the Pacific.

Yellowstone Park, notwithstanding its wild grandeur as a mountain domain, is yet more interesting on account of the geological wonders which are found within its boundaries, namely the geysers and hot springs. The geysers are actively throwing up in jets at periodic intervals, steam and boiling water; the hot springs are either quiescent, or are bubbling and boiling without explosive eruption. They are found in four distinct areas in the Park; the geysers and the hot springs in the Upper, Lower and Norris Geyser Basin, hot springs only in the Mammoth Hot Spring Region. This division also accords with the predominating chemical content of the waters. In the Upper, Lower and Norris Geyser Basins, we have springs and geysers which are actively depositing silicious material (sinter); in the Mammoth Hot Spring Basin, springs which are forming calcareous deposits, called travertine.

Much inquiry has been instituted concerning the therapeutic value of the mineral springs of the Park. Many hot spring regions throughout Europe and America are resorted to by thousands in search of health. The hot springs of Virginia are visited by hundreds every year. It is said of the Yellowstone region, that the first explorers to ascend the Gardiner River, in 1871, found numbers of invalids encamped on the banks, where the hot waters from Mammoth Hot Springs enter the stream; and it is recorded that they were most emphatic in their favorable impressions in regard to their sanitary

effects. No one now goes to the Park on account of its mineral waters. It would, therefore, be premature to assume that there is no medicinal virtue in them. Two great drawbacks are to be encountered, and these alone are sufficient to explain why the Yellowstone will probably never become a resort for invalids. Inaccessibility, length and severity of the winters are sufficient obstacles to the National Park ever becoming such a resort. The open summer season lasts only about three months.

The hot springs and geysers, on the other hand, are interesting to the geologist, because of the remarkable phenomena connected with their origin and activity; to the botanist they are fascinating, because of the low forms of vegetal life found existing in them even at high temperatures.

As before stated, the waters which run from the hot springs and geysers of the Yellowstone may be comprehended under two heads—those which deposit silica, as sinter, and those which form calcium carbonate, as travertine. The last-mentioned substance is only found in the Mammoth Hot Spring Basin; the latter makes up the characteristic formations of the Norris, Lower and Upper Geyser Basins. The question naturally arises, how are the beautiful terraces which surround many of the hot spring centres formed? Are they not simply built up by the deposition of new material from the overflow water, as it evaporates and cools at the surface? At first sight, it would seem that the craters and bowls of the geysers and hot springs were formed in this way, because we know that boiling water, under pressure, will dissolve and hold in solution much more inorganic material than ordinary river or spring water at the normal temperature, and that in many instances, when the pressure is relieved and the temperature lowered, the water will precipitate its mineral contents.

In the case of the richly carbonated waters of the Mammoth Hot Springs, calcium carbonate is deposited by the relief of pressure, by the escape of the carbon dioxide and by the evaporation of the water; but this physical process is not the sole cause of the varied and beautiful terraces, which will presently be described. At the Norris Geyser Basin, relief of pressure and cooling will cause a separation of silica from the hot waters, but the waters of the other geyser basins contain very much less silica, and, as far as has been observed by geologists, neither relief of pressure nor cooling will

produce a separation of the silica. Water collected from the springs and geysers of the Upper and Lower Geyser Basins was perfectly transparent, and remained clear and without sediment after standing for several years. Experiments showed that the silica in these waters remained dissolved, even when the water was cooled down to the freezing point, and it was only after the crystallization of the water by freezing that the silica was separated and settled down as an insoluble flocculent precipitate upon melting the ice.

How, then, are we to account for the production of the exquisite terraces, mounds, pools and geyser cones? It has been proved, in addition to the causes operative in the above instance, that the rapid deposition of the sinter and travertine from both classes of water is due to the action of vegetation in removing the carbon dioxide from carbonated waters, thus depositing calcium carbonate, and, in the case of the silicious waters, depositing by the activity of the protoplasm a gelatinous silica, which, upon exposure, finally hardens. We know, from numerous observations, that plants are active in rock building and disintegration.

The plants of the Carboniferous Period, by their death and consolidation, formed the extensive and useful coal beds. Sphagnum and mosses compacted yield peat, and, in some cases, soft coal. Silicious diatoms have given rise to extensive diatomaceous earths. In several of the higher algæ, for example, *Halimeda opuntiæ*, the carbonate of lime deposited by the plant forms a sieve-like cover about the tips of the algal filaments, and, in *Acetabularia*, it occurs as a tube about the stalk of the plant. In the CHARÆ the lime is separated and deposited in the cells and cell walls of the back alone, while in the *Corallines* it is found only within the cells. Nor is our knowledge of the activity of protoplasm in the deposit of mineral substance solely confined to plants. We know that many animals secrete silex and carbonate of lime, foraminifera, coral polyps and molluscs generally. Before, however, we can understand the part which vegetation has played in forming the travertine and sinter beds of the Yellowstone Park, we must become familiar with the general appearance and character of the deposits themselves.

First in importance among the many points of interest accessible are the Hot Spring Terraces. These have been built one upon another, until the present active portion constitutes a hill rising 300 feet above the site of the Mammoth Hot Springs Hotel. The for-

mation about these springs, it will be remembered, is calcareous, and to this fact is due its distinctive character, so different from the silica formations which prevail elsewhere in the Park. "The overhanging bowls which these deposits build up are among the finest specimens of Nature's work in the world, while the water that fills them is of that peculiar beauty to be found only in thermal springs." Cleopatra Spring, Jupiter Terrace, Pulpit Terrace, Minerva Terrace, are among the most interesting and beautiful of the active springs. One of the most beautiful is a pool filled with pellucid water in violent ebullition. The sides and bottom of the basin are formed of pure white travertine, while the varying depths cause the water to appear all shades of blue and green, from a deep peacock blue in the deeper parts of the bowl, to the lightest of Nile greens in the shallow recesses. In wandering about the terraces, one is much impressed with the brightly tinted basins about the springs, and the red and orange colors of the slopes overflowed by the hot waters. These colors are due to the presence of the microscopic plants, algæ of several forms and species. In the cooler springs and channels similar vegetation forms the bright green, orange or brown membrane-like sheets, or masses of jelly without apparent vegetal structure. Silken yellow filaments are found in bowls and channels of the hottest springs. Words fail to convey an adequate idea of the massive marble-like terraces, rising tier upon tier, and the exquisite coloring of their sides and the margins of the bowls filled with steaming hot water of most magnificent iridescent hues.

The silicious formations are similar, although not raised in terraces so grand or imposing, simply because the formation of silicious sinter is much slower than the formation of the travertine, and because the region seems to be of later geologic age. Many of the geyser cones are bee-hive in shape, of a white adamantine-like appearance, and are, as a rule, delicately colored by pale greens and pinks of exquisite variation. The many hundreds of springs of the Upper Geyser Basin, where they are seen at their best, are generally characterized by the transparent clearness of the water, which appears of varying shades of blue and green, according to the depth and amount of light admitted. Morning Glory Spring is one of the most beautiful springs of the Park, with a funnel-shaped cone suggesting the flower, and with walls most delicately colored.

Black Sand Basin is, however, most interesting for our pur-

pose. The description of Dr. Peale is interestingly comprehensive, and is as follows: "This is one of the most beautiful springs in the Upper Basin. It has a delicate rim, with toadstool-like masses around it. The basin slopes rather gently toward a central aperture, that, to the eye, appears to have no bottom. The water in the spring has a delicate turquoise tint, and as the breeze sweeps across its surface, dispelling the steam, the effect of the ripple of the water is very beautiful. The sloping sides are covered with a light brown crust; sometimes it is rather a cream color. The funnel is about 40 feet in diameter, while the entire space covered by the spring is about 55 x 60 feet, outside the rim of which is a border of pitch stone (obsidian) sand or gravel, sloping 25 feet. From its west side flows a considerable stream, forming a most beautiful channel, in which the coloring presents a remarkable variety of shades; the extremely delicate pinks are mingled with equally delicate tints of saffron and yellow, and here and there shades of green."

The overflow from this spring spreads out over a large area, called Specimen Lake, where absorption of the silica from the water has destroyed many of the trees of the vicinity, the dry, lifeless trunks adding to the attractiveness of the place by affording the appearance of petrifactions.[1] All of these exquisite masses of colors which are found lining the pools, filling the overflow channels and spreading out flat in the lower marshy places, are due to the growth of vegetal organisms belonging to the bacteria and algæ.

Walter H. Weed[2] describes the appearance of the Black Sand Basin and channels filled with algal growths: "As the water from this spring flows along its channel it is rapidly chilled by contact with the air and by evaporation, and is soon cool enough to permit the growth of the more rudimentary forms which live at the highest temperature. These appear first in skeins of delicate white filaments which gradually change to pale flesh-pink farther down stream. As the water becomes cooler, this pink becomes deeper, and a bright orange and closely adherent fuzzy growth, rarely filamentous, appears at the border of the stream, and finally replaces the first-mentioned forms. This merges into yellowish-green, which shades into a rich emerald farther down, this being the common color of fresh-water algæ. In the quiet waters of the pools fed by this stream

[1] Haynes-Guptill, Guide to Yellowstone Park, p. 68.

[2] Weed, Ninth Annual Report U. S. Geological Survey, p. 657.

the algæ present a different development, forming leathery sheets of tough gelatinous material, with coralloid and vase-shaped forms rising to the surface, and often filling up a large part of the pool. Sheets of brown or green, kelpy or leathery, also line the basins of warm springs whose temperature does not exceed 140° F., but in springs having a higher temperature the only vegetation present forms a velvety, golden-yellow fuzz upon the bottom and sides of the bowl. This growth is rarely noticed in springs where the water exceeds 160° F., except at the edge of the pool. If the basin is funnel-shaped, with flaring or saucer-shaped expansion, algæ grow in the cooler and shallower water of the margin, forming concentric rings of yellow, old gold and orange, shading into salmon-red and crimson, and this to brown at the border of the spring. Around such springs the growth at the margin often forms a raised rim of spongy, stiff jelly, sometimes almost rubber-like in consistency, and red or brown in color. Evaporation of the water drawn up to the top of such rims leaves a thin film of silica, which thickens to a crust and so aids in the production of a permanent sinter rim."

Near some springs, for example near the Emerald Pool, algal channels are formed and the waterway is floored with a sheet of olive or emerald green, kelpy jelly. Where there is a moderate current, this lining is nearly smooth, resembling a sheet of wet leather, but in quieter waters this soft carpet is dotted with little warty excrescences, and little pillars produced by the upward growth of the algæ; the pillars sometimes terminate by balloon-like caps or globes containing bubbles of gas. When, by their upward growth, these pillars reach the surface of the pool, they increase rapidly in diameter, and form flat, cap-shaped formations which sometimes merge into table-like expansions of quite peculiar form. The continued growth of new pillars dams up the outlet, and the water collecting forms shallow lagoons or pools of varying degrees of temperature. As the temperature changes, the nature of the growth changes, the bright-colored algous jelly forming the outer covering of the pillars changes to light salmon-pink, and the substance itself becomes noticeably silicious, or forms a filmy web upon the silicious centre.

It has been for some time known that the hot springs of the world support various growths of microscopic plants. Agardh and Corda recognized and described such in the hot springs of Carlsbad,

Bohemia. Later, Cohn, in 1862, showed that the algæ of these springs deposited travertine. Sir William Hooker, in 1809, found CONFERVACEÆ at the borders of many of the hot springs there. *Conferva limosa, C. flavescens, C. rivularis* were abundant in the water. Baring Gould, who visited the Icelandic geyser region in 1864, found in the overflow channels of the spring, Tunguhver, a species of the genus *Hypheothrix*, common in hot waters all over the world. In New Zealand, the presence of algæ in hot springs has been determined. In the hot springs of the Azores, Mr. Moseley found algæ forming a pale yellowish-green layer an inch and a half thick. The temperature of the water was 176° F. to 194° F. A thick, brilliant green growth, consisting of *Chroococcus* was found at the edge of a shallow pool of hot water, where the temperature was between 149° F. and 156° F.

In the hot springs of the Yellowstone no plant life has been found at a temperature exceeding 185° F., some degrees below the boiling point of water, which, at the altitude of the park (7,000–8,500 feet) is 198° F. The most luxuriant growth of algæ is found in water which has cooled down to a temperature of 104° F. to 122° F. In water of a temperature ranging from 100° F. to 125° F., we have the greatest display of color, because many green algæ can live in water of that degree of heat. In the hottest waters (185° F.) only white filamentous bacteria are found, which gradually become of a sulphur-yellow color at 175° F. This yellow growth is due to a species of *Beggiatoa*, a plant which may be classed with the BACTERIACEÆ, and which, during life, deposits sulphur granules.

As the water cools down, other forms of vegetable life appear, give variety to the colorations and give beauty to the borders of the hot pools and overflow channels leading from them. The sequence of temperatures and of colors is somewhat as follows: white, 160° F.–185° F.; yellow, 145° F.–160° F.; red, 130° F; green, 110° F.–130° F.; green-orange-brown, 95° F. There are variations, however, in the sequence of these colors, owing to various environmental conditions. Thus, in the Black Sand Basin and Specimen Lake, the range of color is somewhat this: White, yellow, flesh pink, bright pink, yellowish-green, emerald.

Studying the growths at the several temperatures, we find *Leptothrix laminosa* growing at 135° F.–185° F.; *Phormidium* at 165° F.; *Beggiatoa* at 150° F.–165° F., and *Spirulina* at a lower temperature.

*Gleocapsa*, a blue-green alga, is found growing on the sides of geyser cones, where steam is escaping, forming there a delicate olive-green coloration. A kind of fibrous sinter is formed by the growth of the little alga, *Calothrix gypsophila*, or the young form of *Mastigonema thermale*, the latter olive colored, and forming the sinter of the crater of the Excelsior Geyser.[1] A coarse sinter is due to a bright red species, *Leptothrix*, a finer variety to *Leptothrix* (*Hypheothrix*) *laminosa*, ranging in color from white to flesh pink, yellow and red to green, as the water cools. Besides the above plants, which belong to the BACTERIACEÆ and the CYANOPHYCEÆ, speaking in a general way, we find that several mosses, MUSCI, are active in the formation of sinter on the slopes below Hillside Spring. These springs issue from the rhyolite slopes beneath the cliffs of the Madison Plateau, and the waters, whose temperatures are 184° F.–198° F., contain both silica and lime in solution, which they deposit in their downward flow. This moss has been determined by Prof. Charles R. Barnes, of the University of Wisconsin, to be *Hypnum aduncum, var. grasilescens*, Br. and Sch.

Besides the sinter and travertine formed by algæ, which remove in the case of the carbonated waters, containing calcium bicarbonate, $Ca(HCO_3)_2$, in solution, the gaseous carbon dioxide, thus depositing calcium carbonate, $CaCO_3$, we have stalactites produced by the growth of several algæ, *Gleocapsa violacea, Schizothrix calcicola, Synechococcus æruginosus* and *Phormidium* (*Leptothrix*) *laminosum*. An interesting account of the formation of these stalactites has been given to us by Miss Josephine Tilden, who visited, recently, the Yellowstone Park.

In the tepid waters of the overflow basins, for example Specimen Lake, which is produced by the water from the Black Sand Pool, we find extensive diatomaceous beds formed by the growth of numerous diatoms. The water of these areas has encroached on the timber, killing the trees, which stand as bare poles from the treacherous marshes. It is known that these plants deposit silica, as a box, test, or frustule, and it is thus by the activity of the protoplasm that the silicious diatomaceous earths are formed. Samples of this material show the presence of *Denticula valida*, which forms the bulk of the material, *Denticula elegans, Navicula major, N. viridis, Epithema, Cocconema*, etc.

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[1] Weed, *loc. cit.*

It seems likely to me, in studying the vegetation of hot springs, notwithstanding the statements of Prof. Ernst Hæckel, of Jena, in his interesting work, "Systematische Phylogenie der Protisten und Pflanzen," that the early forms of life on this globe were green unicellular algæ, and from these by retrogression and development other forms have sprung, animal life appearing later than plant, it seems to me, I repeat it, that we must look to the hot springs for the most primitive forms of life, because the temperature conditions are such as more nearly to simulate the conditions existing when this world of ours was in a highly heated state, when seismic phenomena were the rule rather than the exception. It would be necessary in order to establish this proposition to investigate comparatively the vegetation of all the hot springs of the globe, before it would be safe to make such a general declaration as to the origin of vegetal life.

The above ecological sketch sufficiently discloses the salient characters of the interesting geysers and hot springs of the Yellowstone Park. In preparing this article, the writer has endeavored to give the results of personal observation on the spot during eight days of August, 1897. He has been materially aided in its preparation by the following papers and books, which give a somewhat more detailed account of the Yellowstone Wonderland:

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UNIVERSITY OF PENNSYLVANIA, November 16, 1897.

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## POMEGRANATE RIND.

BY HENRY TRIMBLE.

Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 171.

At this season of the year pomegranate fruit is frequently seen on the market stalls of Philadelphia and other Northern cities, and is brought here from Spain. Small quantities of the fruit are raised in the Southern States and in California, but so far it has never attained much popularity with us, partly, no doubt, on account of

the price, but more because we have not tried the exceedingly juicy and slightly acid pulp.

Since the main object of this paper is to consider the constituents of the rind or peel, it is not necessary to dwell on the history, source, etc., of the plant and its fruit, as full descriptions of them are to be found in several text-books.

The rind of the fruit has long enjoyed a reputation in medicine as an astringent, especially in chronic cases; it also possesses, in some degree, the anthelmintic properties of the root and stem barks.

The most important constituents of the rind are the yellow coloring matter and the tannin; the former has been employed considerably as a dye, especially in producing yellow morocco leather. The tannin has been used in the manufacture of leather in nearly all the countries where the fruit is found.

The writer has always been somewhat skeptical about the high percentages of tannin which have been reported, and has undertaken to verify or refute them.

The fresh rind from some Spanish pomegranates purchased in the Philadelphia market gave the following results:

| | Per Cent. |
|---|---|
| Moisture | 56·66 |
| Ash in absolutely dry substance | 3·92 |
| Tannin " " " | 28·38 |

The figures obtained by Mr. Griffith H. Maghee, a student in the Laboratory, confirmed these, although his estimations were made on different lots of rind. Others have reported from 20 to 30 per cent. of tannin.

Flückiger found 5·90 per cent. ash in the rind dried at 100° C., as in the above case. A recent estimation on a new lot of rind gave me 3·68 per cent. ash in dry substance.

A quantity of the tannin was extracted from the rind with acetone, and purified according to the usual method; on drying at 120° it yielded, on combustion, the following results:

| | Per Cent. |
|---|---|
| Carbon | 52·11 |
| Hydrogen | 4·17 |
| Oxygen | 43·72 |
| | 100·00 |

A portion of the tannin dissolved in water gave the following characteristic reactions:

| | |
|---|---|
| Ferric salts | Blue-black precipitate. |
| Bromine water | No precipitate. |
| Calcium hydrate | Yellowish ppt., turning brown. |

These reactions correspond with those of gallotannic acid, and the combustion results show a composition very similar to the same acid, so it may safely be concluded that the tannin of pomegranate rind is identical with gallotannic acid. This is in accord with the results obtained by Culley[1] on the tannin of the root bark.

[1] AMERICAN JOURNAL OF PHARMACY, 1894, page 280.

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## THE DIGESTIVE POWER OF PEPSIN IN THE PRESENCE OF ALCOHOL.[1]

BY C. SYMES, PH.D.

Some years ago I conducted a series of experiments with a view of determining the relative digestive value of the various pepsins then on the market, and published the result of the inquiry.[2] Subsequently I was requested to continue and extend the investigation for publication in one of the medical journals, and in consequence I gained some amount of experience in this kind of work. The experiments were carefully conducted and, after a lapse of time, were repeated by a French investigator, who confirmed my results. Time, "which tries all things," also testified to their correctness, for the pepsin, which was then mostly prescribed and relied on, has since practically disappeared from the market, its quality having been found by experience to be inferior to that of similar preparations by other makers. Apart from the relative value of various pepsins, I also experimented on the digestive power possessed by pepsin in the presence of alcohol, and found that its activity was reduced in proportion to the amount of alcohol present. From this I drew deductions which I have since learned to modify, although the facts remain. I condemned wine as a vehicle for the administration of pepsin because of its property of retarding the activity of the medicinal agent it carried, and recommended in the place thereof a solu-

[1] *Pharmaceutical Journal*, November 6, 1897.

[2] *Pharmaceutical Journal* (3), IV, 1. See also note on "Latent Pepsin," by G W. C. Phillips, in *Pharmacist*, VIII, 200, and "Year Book of Pharmacy," 1875 p. 317; paper on "Pepsin and Alcohol," by M. Bardet, *Nouveaux Remèdes*, 1887, p. 243, and *Pharmaceutical Journal* (3), XVIII, 93; and paper on "Pepsin Wine," J. Clark, *Pharmaceutical Journal* (3), XXII, 597.

tion of fresh pepsin in raspberry vinegar. This constitutes an excellent preparation, and at present I know of no better; but the public never took very well to this "pepsin elixir," as many persons have a decided objection to acids. It has, however, been prescribed with satisfactory results.

The experiments referred to were conducted in glass bottles placed in a water-bath kept at a uniform temperature of 100° F. by means of a Reichart's thermo-regulator. The importance of adopting the same temperature on all occasions when conducting comparative experiments was rendered evident by increasing the temperature to 110° F., when digestion was found to proceed much more vigorously than at 100° F., all other conditions being equal. Still, the presence of alcohol had the same prejudicial effect in retarding solution of the coagulated albumen used. If, however, the bottles were replaced by wetted animal membranes, the condition of things was materially altered. It was found that the alcohol present in the liquid through which the coagulated albumen was distributed soon began to diffuse through the wetted membrane, and that the pepsin commenced to act with the same energy as in those containers where no alcohol was present, so that at the end of two hours there was no considerable difference between the weight of undissolved albumen in each case. The interest which this experiment has for us, as pharmacists, is that it shows that an alcoholic liquid, such as wine, may be used in preparing a solution of pepsin for medicinal use, and that if properly made it soon becomes active when taken into the stomach in the presence of suitable food. Rectified spirit may also be used as a preservative in making essence of rennet, because its excessive dilution and ready evaporation, when mixed with the proper quantity of milk and warmed, overcome any prejudicial effect the spirit may have on the peptic bodies present. Glycerin is an excellent solvent of pepsin, as is well known; but unless it is used in sufficiently large quantity to render the solution distasteful to the patient, it is not a good preservative. A solution of freshly prepared undried pepsin in dilute glycerin, to which 10 per cent. of rectified spirit is added, forms, when filtered, an excellent medicinal preparation which may be flavored to taste.

# THE CHEMISTRY OF CLOVE OIL[1]

Erdmann has published some interesting results of his investigation of clove oil and the oil distilled from clove stalks. In preparing caryophyllene by treating clove oil with solution of caustic alkali, the undissolved portion of the oil was always found to be oxygenated, and only by using alcoholic potash was it obtained free from oxygen. Oil from clove stalks shaken with dilute caustic alkali yielded at once the sesquiterpene.

On treating the oil that is separated from clove oil by solution of caustic alkali, with alcoholic potash, and adding some ether to dissolve and separate the terpene, the alkaline solution was found to contain eugenol, which was separated on acidifying with sulphuric acid, and on distilling the acidified liquid, acetic acid was obtained. Hence it was evident that clove oil contains, as one of its constituents, aceteugenol, a compound which is at once saponified by alcoholic potash, but less readily by a water solution of caustic alkali, and thus the presence of oxygen in the oil undissolved by caustic alkali solution was accounted for, as well as the circumstance that neither this undissolved oil nor clove oil itself has a constant boiling point. That is not due to difference in the amount of caryophyllene; for though it has a somewhat higher boiling point than eugenol, the tension of both substances is nearly the same at 123° C., under a pressure of 13 millimetres, and the higher boiling-point, 125° to 150° C., of the oil undissolved by caustic alkali is due to the presence of aceteugenol.

In the determination of eugenol in clove oil by Thoms' method,[2] it is assumed that the whole of the eugenol is present in the free state, and the question arose whether the presence of some portion of it in the state of ester affected the determination. That was found to be the case by comparative experiments with clove oil previously saponified by heating to 100° C., with caustic alkali, and with oil which had not been so treated, the results given by three samples being as follows:

| | Thoms. | Total eugenol. |
|---|---|---|
| Clove oil, A | 83·9 | 85·68 |
| Clove oil, B | 82·97<br>82·77 | 84·84 |
| Clove oil, C | 80·2 | 81·9 |

[1] *Jour. Prakt. Chem.*, LVI., 175, through *Pharmaceutical Journal*, November 6, 1897.

[2] *Pharmaceutical Journal*, (3), XXII, 450.

The low specific gravity of the oil distilled from clove stalks, as compared with the large amount of eugenol it contains, is explained by the absence of aceteugenol, the relation between the specific gravity and the amount of eugenol in the case of clove oil being due to the presence of some aceteugenol, the specific gravity of which is much greater than that of eugenol.

On saponifying clove oil with a known quantity of alcoholic potash, and determining the residual free alkali, a result was obtained indicating the presence of a much larger quantity of aceteugenol than was actually present, and this was ascertained to be due to the presence of a compound yielding salicylic acid, the occurrence of which in clove oil was pointed out by Schenck,[3] but disputed by Wassermann.[4]

By merely shaking clove oil with solution of caustic alkali, no indication of salicylic acid is obtained; but after the saponification effected by boiling with soda solution, salicylic acid can be detected in the aqueous liquor. It is suggested that the compound present in clove oil, and yielding salicylic acid by saponification, may be eugenol ester of acetyl salicylic acid.

The yellow coloration produced on treating clove oil with caustic alkali was suggestive of the presence of an aldehyde, and a product was obtained which proved to be furfurol, a substance which Messrs. Schimmel have also found in clove oil, together with normal amyl-methyl ketone, to which they attribute some influence as to the cause of the ether-like odor of clove oil, which a mixture of eugenol, caryophyllene and furfurol does not possess.

Erdmann also suggests that eugenol is probably not the only phenolic constituent of clove oil, because the boiling-point of the crude product has a wider range than is consistent with its chemical individuality, and also because in redistilling eugenol he has obtained a residue of phenolic character, though its resinoid character did not invite further investigation.

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[3] *Ann. Chem.*, 125, 14.
[4] *Ann. Chem.*, 179, 369.

# RECENT LITERATURE RELATING TO PHARMACY.

## ASCLEPIAS CURASSAVICA AS AN INSECTIFUGE.

The following information concerning the uses of this plant is taken from the *Kew Bulletin*, October, 1897, and which, as there stated, appears to be unrecorded:

The plant grows everywhere, as a weed about the Isthmus of Tehuantepec (Southern Mexico), and is used by the Indians there to keep away vermin, especially fleas, for which latter purpose it is reported as being most successful. They make a rough broom of it, and sweep the floors and walls of their huts, and find that they are not troubled with fleas for a considerable time afterwards. They have tried brushing dogs with it when their coats are full of vermin, and it appears to answer the same purpose with them.

The Indian name of the plant is "Chilpati."

## DETERMINATION OF THE ALKALOIDS IN SOLANUM CAROLINENSE.

In a recent communication (*The Journal of Pharmacology*, Vol. 4, p. 225), Charles Gundlich refers to the results obtained by G. A. Krauss and Professor J. U. Lloyd in their investigations of Solanum Carolinense. He then outlines the processes which he employed for the extraction of the alkaloidal constituents of the drug. The alcoholic liquid in which the fruit was preserved was examined by various methods, but only traces of alkaloid could be found. Then an examination of the fruit was undertaken, but only traces of alkaloid were found in 500 grammes of material. Next, 10 grammes of the powdered root were examined, using various solvents for the extraction of the alkaloid, but only traces could be found. Lastly, 1,000 grammes of the finely-powdered root were treated with dilute acetic acid (10 per cent.), but with no better results. At this juncture, the author learning that Professor Lloyd had used several hundred pounds of drug for obtaining his material, the investigation was given up.

## CAFFETANNIC ACID.

Paul Cazeneuve and E. Haddon (*Compt. rend.*, 1897, **124**, 1458–1460) have recently studied this subject. Since the investigations of Hlasiwetz, caffetannic acid has been usually regarded as having the formula $C_{15}H_{18}O_8$, but the authors, from a study of the behavior of the substance towards phenylhydrazine, conclude that it has the composition $C_{21}H_{28}O_{14}$, and ascribe to it the constitutional formula:

$$COOH\ .\ CH : CH\ .\ C_6H_3(O\ .\ C_6H_{11}O_5)_2.$$

The *osazone* of caffetannic acid, $C_{45}H_{48}N_8O_{10}$, crystallizes in yellow needles, very sparingly soluble in alcohol, and melts at 180°; it is insoluble in most media, and is so sparingly soluble in phenol and naphthalene that no determinations of molecular weight have been possible.

The sugar, $C_6H_{12}O_6$, obtained on hydrolyzing caffetannic acid, will be described in a subsequent paper.—*Journal of the Chemical Society*, London, October, 1897.

PREPARATION OF HYDROGEN PEROXIDE.

Hydrogen peroxide may rapidly and economically be prepared, according to Pedro Etchegorry (*Tribuna Farmaceutico*, **1**, 16), by triturating with ice a mixture of 1 part barium peroxide and 2 parts (by weight) of hydrochloric acid. The following reaction takes place.

$$BaO_2 + 2HCl = H_2O_2 + BaCl_2.$$

The filtered solution is treated with a solution of silver sulphate until no more precipitation occurs, according to the following reaction:

$$BaCl_2 + H_2O_2 + Ag_2SO_4 = BaSO_4 + 2AgCl + H_2O_2.$$

On filtering, the barium sulphate and silver chloride are retained on the filter, while the hydrogen peroxide passes into the filtrate in a state of purity.

This process has already appeared in some text-books on chemistry and, consequently, is not new; but it seems worthy of further investigation.

CAFFETANNIC ACID (GLUCOSYLCAFFEIC ACID) AND ITS DECOMPOSITION INTO CAFFEIC ACID, VINYLCATECHOL, AND CATECHOL.

Hermann Kunz-Krause (*Ber.*, 1897, **30**, 1617-1622) has recently studied this subject. Both caffetannic acid and matétannic acid, when hydrolized, yield a syrupy sugar and caffeic acid (dihydroxy-cinnamic acid). This acid, when heated at 200°, readily loses carbonic anhydride, yielding vinylcatechol (3:4-dihydroxycinnamene), the decomposition at this temperature being quantitative. A characteristic reaction for vinylcatechol is the one previously mentioned (*Arch. Pharm.*, 1893, **231**, 635). This reaction is also given by Tiemann and Will's hesperetol or vinylcatechol paramo-

nomethyl ether (Abstr., 1881, 739). The carmine-red coloration with sulphuric acid therefore appears to be characteristic of 3 : 4-dihydroxycinnamene and its ethers. The author has only succeeded in obtaining the vinylcatechol as an amorphous powder; it is a somewhat unstable substance, for when distilled under a pressure of 12 millimetres it is decomposed, the chief product being catechol. The author thinks it probable that caffetannic acid is distributed throughout the vegetable kingdom in very much the same manner as choline.—*Journal of the Chemical Society*, London, October, 1897.

## CHINESE BANDOLINE WOOD.

The origin of this curious product, of which a specimen has long been in the Museum of the Royal Gardens, has always been a puzzle.

Shavings of the wood yield a mucilage, when soaked in water, which is used by Chinese ladies in "bandolining" their hair. Dr. E. Bretschneider ("Notes on Some Botanical Questions Connected with the Export Trade of China," 1880, p. 14,) mentions the shavings as being exported from Canton to Peking, under the name of "meio kao pao hua" (*i. e.*, cosmetic glue shavings), and their probable source as Sterculia plantanifolia. In 1895, G. M. H. Playfair, Esq. H. B. M. Consul at Ningpo, sent to Kew specimens in leaf of a tree, called "tiao chang," which he had collected in the mountains near Ningpo, with the information that shavings of the wood were used for the purpose described above by the women of that part of China. These specimens were identified as Machilus Thunbergii, Sieb. et Zucc., and flowering specimens subsequently received from the same gentleman confirmed the identification. Mr. Playfair further adds, on the authority of Dr. A. Henry, that the Canton shavings are from the same tree.

The species is a native of Hong Kong and Chekiang westward to Szechuan, in China; also of Formosa, Japan, and the Corean Archipelago. Owing to the interest attaching to the identification, the species has been figured in Hooker's "Icones Plantarum" (t. 2538). —*Kew Bulletin*, October, 1897.

## FUNCTION OF TANNIN IN PLANTS AND ESPECIALLY IN FRUITS.

C. Gerber (*Compt. Rend.*, 1897, **124,** 1106-1109) has practically studied this obscure but interesting subject, and reached the following conclusions: In the respiration of soft fruits containing tannin,

the volume of the carbonic anhydride evolved is less than that of the oxygen absorbed so long as any tannin remains unaltered. As soon as all the tannin has disappeared, pectin is produced. If the temperature is so low that the cellular activity is not great, the respiration quotient remains lower than unity; but if the temperature is so high that the cellular activity requires more energy than is furnished by the free oxygen, the cellules obtain the necessary energy from the alcoholic fermentation of the sugars, the carbonic anhydride produced by it being added to that produced by respiration, and thus giving a quotient higher than unity. It follows that one of the principal functions of tannins in fruits is to prevent pectic transformations, and thus check the fermentation of the sugars.

Direct experiments with the fruit of Dyospyros kaki show that the disappearance of tannins does not involve an increase in the amount of sugar, and experiments on the respiration of Sterigmatocystis nigra on a solution of nut-gall tannin lead to the same conclusion. In fruits containing tannins, the latter disappear as the result of complete oxidation, without forming any carbohydrates.—*Journal of the Chemical Society*, London, October, 1897.

## LICORICE ROOT GROWN IN NEW SOUTH WALES.

In the *Northern Star*, Mr. W. Finselbach,. Ph.D., Lismore, N. S. W., mentions that at a recent local agricultural show, the Government Experimental Farm exhibited two samples of Spanish licorice root, the stolens or suckers, only two years old, being 12 feet long. While a student under Professor Flückiger, in Strassburg, and while travelling in Italy, he had frequently examined three and four-year-old roots, running from 9 to 10 feet long, showing that the soil and climatic conditions of the Lismore district, at any rate, were very favorable to the growth of the plant. He states that he has made an analysis of the samples exhibited, and finds them to be of first-class quality, although they have not secured full maturity. In parts of Italy he saw the licorice cultivated on maize fields. The plant requires three, and, in wet seasons, even four, years, to mature. and the general custom where licorice is grown rationally is that a crop of another kind should be found on the same field. An acre in Europe is said to produce three or four tons of the roots, worth on the London market 12*s.* to 16*s.* per cwt. There is a large consumption of the root in the United Kingdom, Mr. Finselbach says,

in the brewing trade as well as for medicinal uses, and we may add in confectionery. The largest consumers, however, are the United States. Mr. Finselbach suggests that the plant, which can be grown from suckers, would be a remunerative crop in certain districts.—*The Pharmaceutical Journal of Australasia*, August 28, 1897.

### ON MORRHUOL AND THE ALLEGED IODINE AND THE BROMINE CONSTITUENTS IN COD-LIVER OIL.

Charles Gundlich (*The Journal of Pharmacology*, Vol. 4, pp. 223), reports that in experimenting with cod-liver oil for the production of the so-called morrhuol, he first tried concentrating a pure oil in a vacuum of 15 millimeters pressure at 100° C., he having surmised that this substance might be the concentrated oil. The results were negative.

A sample of crude oil, having a specific gravity of 0·923, and Hehner value 95·15 (percentage of insoluble fatty acids), was then treated, after ascertaining its freedom from free acids, with 80 per cent. alcohol. The alcoholic extract was evaporated, and the product obtained had a specific gravity of 0·900 at 19° C., and congealed at 4° C. In these respects it corresponded with samples of purchased morrhuol (one foreign, one domestic), as well as in taste, odor and color. The author is, therefore, of the opinion that the commercial product is prepared in a like manner from any crude product sold as cod-liver oil.

Tests for iodine and bromine showed that they were neither present in the crude oil used in the preceding experiment nor in the purchased morrhuol.

The latter appeared to be a mixture of various impure fatty oils, for, after repeated attempts at fractional distillation, no products could be isolated having a uniform boiling point.

An examination of the crude cod-liver oil and the morrhuol for amine derivatives revealed their presence in each. The process for the separation of the amines was applied to a sample of oil from which morrhuol had been extracted by treatment with alcohol, and the results showed that a large proportion of the alkaloids had been removed by this treatment. The conclusion is therefore reached that morrhuol contains a considerable quantity of amines.

### A NEW ALKALOID, RETAMINE.

Battandier and Malosse (*Jour. de Ph. et de Chim.* [6], **6**, 241) have separated from the young branches and bark of Retama

sphærocarpa, by the ordinary processes, a perfectly definite alkaloid, which they have named *Rétamine*. A kilogramme of the fresh plant furnished some 4 grammes of alkaloid. This alkaloid is slightly soluble in water and in ether; alcohol and petroleum ether dissolve it more readily; and chloroform dissolves it very readily, but not without some decomposition. It crystallizes in long needles by chilling the saturated petroleum ether solution, and in prismatic plates by similarly cooling the saturated alcoholic solution; the spontaneous evaporation of its alcoholic solution yields beautiful rectangular tables. It is dextrogyre, melts at 162° C., and decomposes at a higher temperature, giving a sublimate in long needles, and other products having the odor of pyridine.

Rétamine imparts a distinct color to phenolphtalein. It is a powerful base, which combines energetically with acids, and yields clearly-defined salts. It displaces ammonia, especially with heat, and precipitates the hydrates of iron, copper, etc. The caustic alkalies precipitate it from its saline solutions. It possesses extremely energetic reducing action—the chloride of gold and phosphomolybdic acid are instantly reduced, the salts of silver and ferricyanide of potassium are more slowly reduced, while the mercuric chloride is changed to the mercurous salt. It gives the general reactions of alkaloids and furnishes with potassium bismuth iodide, a beautiful red precipitate. The chloride of platinum is not precipitate, by it, but it gives feebly, with ammonium sulphide, the reaction of sparteine.

The salts of rétamine crystallize very easily and with great distinctness, except the nitrate, which has only been obtained in the form of a varnish. The salts which have been studied contain for 1 molecule of rétamine, either 1 or 2 molecules of monobasic acid.

The solubility in absolute alcohol is 2·462 parts in 100 of solvent. The specific rotation is $[\alpha]_D = 43°,15'$. The elementary analysis indicated the formula $C_{15}H_{26}N_2O$. It is probably an oxysparteine, but differs from the artificial oxysparteine known at present.

### THE TREATMENT OF TUBERCULOSIS WITH CINNAMIC ACID.[1]

It is interesting to note that a remedy is recommended for the treatment of tuberculosis, which is neither a new synthetic compound nor a product of some manufacturing firm.

Dr. T. Heusser, of Davos-Platz (*Therapeutische Monatshefte;*

[1] *The New York Medical Journal*, October 16, 1897.

*Therapist*, September 15, 1897), relates his experience with cinnamic acid in the treatment of tuberculosis. He states that the theory upon which the method of using cinnamic acid is based, was propounded by Landerer in 1888. The important points to be noted in the treatment are: (1) Induction of general leucocytosis. (2) Aseptic inflammation of the tuberculous centre, commencing with a circumvention and permeation of the tubercles with leucocytes, subsequently with young vessels and vascular tissue. To bring about these conditions, Landerer used an intravenous injection of an emulsion of cinnamic acid; but Dr. Heusser prefers to use gluteal injections of the emulsion on account of the danger attending the former method of administration. He uses a minim and a half of a 5 per cent. emulsion for the beginning dose, which he increases gradually with each injection. If the symptoms are favorable, these are made every second day. The maximum dose is 15 grains and is continued until the end of the treatment, which is continued for a month after all symptoms disappear.

In summarizing his opinions with regard to his experience with this treatment, the author stated that: (1) Cinnamic acid is a drug having great influence on tuberculosis. (2) The gluteal cinnamic acid injections, if cautiously made, are absolutely innocuous. (3) The gluteal cinnamic acid treatment is capable of curing a considerable number of cases of pulmonary tuberculosis. (4) Cinnamic acid is not a specific against tuberculosis.

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*Citric acid* is reported as manufactured in San Diego, Cal., a factory for its manufacture, along with oil of lemon, having been established in 1896. It takes from four to six weeks to condense the juice from 60 to 70 pounds of lemons into 1 pound of acid. The factory employs seven hands, has steam works, and a capacity for 40,000 lemons a week; only culls are used.—*Chem. Trade Jour.*, October 2, 1897.

*Cadmium* is meeting with an increasing demand, and the shortage in the supply still continues, notwithstanding a little more is being made in Upper Silesia (which is, practically, the only district where cadmium is produced).

The Upper Silesian production in the first quarter of the current year was 3,326 kilos, valued at 11·844 marks per kilo, against 3,256 kilos, valued at 10·261 marks per kilo in the last quarter of 1896; and 2,436 kilos, valued at 5·380 marks per kilo in the first quarter of 1896. At present, it is said the metal is lacking entirely, and urgent demands for it cannot be satisfied. If the new demand proves to be permanent, however, there will be no difficulty in meeting it, since most of the Upper Silesian ore is cadmium-bearing, and the metal can be recovered without difficulty as a by-product.—***Eng. and Mining Jour.***, October 9, 1897.

# EDITORIAL.

## PURE FOOD LAWS.

Last month we printed a circular letter of inquiry from the Agricultural Department at Washington, concerning adulteration of foods and drugs and laws governing them. One of the questions was: "Would a national food and drug law assist in preventing adulteration?" In the light of some years of study of food and drug laws, we have hesitated to attempt an answer to any of the inquiries, for the reason that occurrences are frequently taking place which tend to weaken one's confidence in all laws which propose to regulate the quality of foods and drugs.

One of the most notable instances of this kind occurred recently in Pennsylvania. A special despatch to the *Public Ledger*, of Philadelphia, and printed in the issue of October 30, reports that the Pure Food Bureau of the Department of Agriculture at Harrisburg seems to be laboring with the question, "Is mustard a food or poison?" We quote a part of the despatch, as follows:

> A sample of ground mustard, recently sent to the Department by one of its special agents, was found to contain 70 per cent. of adulteration. Suit was brought in Monroe County, where the sample was found, against the party who sold the goods. During the trial the adulteration was not denied and was proven beyond all doubt, but the question was raised as to whether mustard was a "food" within the meaning of the pure food law. A resident medical practitioner testified that it was a poison, and not a food; the chemist of the Department testified that it was food. In giving the case to the jury the judge instructed them that the question of food was one of fact which they must decide for themselves, and if they believed it was not they must acquit the defendant, but if they believed that it was a "food," they must convict him.

To make this farce more complete, the jury disagreed as to guilt, and directed that the costs be divided between the defendant and the county. When asked for their reasons for this verdict, the foreman stated to the court that six of the jury thought that mustard was a food and the remaining six took the opposite view, and, to satisfy those who thought it was a food, they put one-half of the costs on the defendant, thus showing that they thought him about half guilty. It is such cases as this that make one skeptical about all laws which have for their object the prevention of adulteration. With such a judge and jury a national law would not be of any more value than one enacted by the State. It has been said that two many laws breed anarchy, and the same might be said of the poor administration of a few laws.

## DESTRUCTION AS A MEANS OF PROTECTING PRICES.

The history of the partial destruction of the tobacco crop in Virginia in 1639, as detailed in our last issue by Professor Lloyd, finds a modern parallel in the action of the Spanish Government. In the *Cosmopolitan Magazine* for November, John Langdon Heaton, on "Some Curiosities of Farming," makes the following statement: "But perhaps the most phenomenal peculiarity of Spanish agriculture is the fostering care given it by the Government. This enlightened rule not long ago caused to be destroyed in a single province 6,000,000 tobacco plants, not because of any prejudice against nicotine, but in order not to disturb the tariff income from Havana imports. This is a tariff for revenue only."

# REVIEWS AND BIBLIOGRAPHICAL NOTICES.

THE RIGHT SIDE OF THE CAR. By the author of "Etidorhpa" (John Uri Lloyd). Richard G. Badger & Co., Boston, 1897.

While this dainty volume has little in it bearing directly on pharmacy, still we are induced to notice it in these pages, not only on account of the distinct merit of the work, but also because of the author's well-known contributions on pharmaceutical subjects. That it will be read and enjoyed by pharmacists more than by any other class, we have little doubt. It is the second venture of the author in literature, and his transition from "Etidorhpa" to this is as startling as his first departure from scientific literature.

"The Right Side of the Car" is a short story of a ride across the Great American Desert on the Northern Pacific Railway, and of the approach to Mount Tacoma. The author will have none of the modern name, Mount Ranier after an obscure British admiral who never saw this continent; it does not compare with Tacoma, given to it by the Indians long before the British landed in America.

Two editions of this book have been issued, one a special author's souvenir edition, and the other for popular sale; the former will only be sent to those who have subscribed in advance. The profits of both will go to erect a monument to the late Professor John King.

PHARMACOPŒIA OF THE AMERICAN INSTITUTE OF HOMŒOPATHY. Published for the Committee on Pharmacopœia of the American Institute of Homœopathy. Otis Clapp & Son, agents, No. 10 Park Square, Boston, 1897.

In reviewing a work of this kind it is difficult to avoid drawing comparisons between the two branches of the medical profession, as well as between the two pharmacopœias representing those branches. It is the intention, however, to review this homœopathic pharmacopœia on its own merits and without unnecessary reference to other works in existence.

As long ago as 1868, the American Institute of Homœopathy, realizing the need of "a dispensatory which should embrace pharmacy," appointed a committee to prepare one. Reports of progress were made from time to time until 1888, when, owing to the death of the chairman some time previously, and the loss of the original manuscript, a new committee was appointed, consisting of twelve members, six to represent the profession of medicine and six to represent the profession of pharmacy.

The following quotation from the historical introduction is of interest, as it indicates the extent to which recognition is accorded homœopathic pharmacy.

> It is earnestly hoped that each and every medical college will hereafter include in its curriculum, instruction in the principles and practice of pharmacy. The physician who dispenses medicine should at least be qualified to supplement the work of the professional pharmacist so thoroughly and accurately that his clinical reports will have a scientific value. Pharmaceutical knowledge seems to be even more important to the homœopathic than to allopathic practitioners, for the reason that only a portion of the former are within easy reach of the professional pharmacist who understands the preparation of medicines for homœopathic use.

The great bulk of the book of 674 pages is divided into three parts. Part I, of some 30 pages, is devoted to General Pharmacy, under which the following subjects are treated: Unit of Medicinal Strength, Menstrua, Drugs and Medicinal Substances, General Treatment of Drugs, Preparations from Drugs, Tinctures, Dilutions, Triturations, Medications, Prescriptions.

Part II is devoted to Special Pharmaceutics, and occupies some 545 pages. In this section the various medicinal substances are taken up in alphabetical order, and considered somewhat as they are in the U. S. Pharmacopœia, but in some respects rather more fully, which gives the book a resemblance to a dispensatory. For instance, the first article, Abies Canadensis, is treated under the following heads: Natural Order, Synonyms, Description, Habitat, History, Parts Used, Preparations. The last heading embraces the tincture and method of preparing it.

Acidum Aceticum and other chemical substances and compounds are treated under the following headings: Chemical Symbol, Synonyms, Description Preparations. Many of the physiologically active metallic salts and alkaloids have the maximum dose given.

Part III consists of some 25 pages of Select Tables for Reference, many of which have been taken by permission from the U. S. Pharmacopœia; List of Medicines and Pronunciation, 15 pages, and Index of over 50 pages.

The Section in Part I, on General Pharmacy of Drugs for Homœopathic Use, is a concise statement of the processes used in, and the principles governing homœopathic pharmacy, and any well-educated pharmacist would be able to practise homœopathic pharmacy after a careful reading of this part. A section is devoted to cleanliness and cleaning of utensils, which contains directions concerning that which has been one of the reasons for the existence of homœopathy. Every school of pharmacy and medicine should keep the subject of cleanliness constantly before the students.

The first edition of a book having the scope of this one is sure to contain a number of errors, and a few of these may be pointed out.

The term "chemical symbol" is used throughout the book where in most cases "chemical formula" would be more in accordance with chemical nomenclature. In the German *säure*, the umlaut is in nearly every instance placed over the *u*, making *saüre*. The sweeping statement is made that tannic acid "unites with all vegetable alkaloids, forming whitish precipitates," which will not hold true in the cases of morphine and caffeine. Petroleum ether and petroleum benzin are given as synonyms of nitrobenzol, which is away off from the truth, very misleading and liable to cause serious accidents.

In regard to the nomenclature in the book, it may be said to be a mixture of ancient and modern systems; for example, in accordance with the reform spelling movement, the final *e* is dropped from chloride, iodine and the alkaloids; consequently we have in this case *morphin acetate*, in which the *e* is dropped from morphine, where it is of use in distinguishing the alkaloid as a member of its class, while it is retained in the acetate, where it is of no apparent use.

We believe that this book has been compiled with a hope of removing the veil of mystery which apparently surrounds homœopathy, but the dismissal of a few substances like "Hahnemann's Causticum" would remove both book and school from the possible accusation of mysticism.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS, with special reference to the application of remedial measures to disease and their employment upon a rational basis. By Hobart Amory Hare, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. Philadelphia: Lea Bros. & Co. 8vo, Pp. 758. Sixth edition.

The fourth edition of this valuable and practical work was noticed in the

AMERICAN JOURNAL OF PHARMACY, 1894, p. 494, and the good opinion then expressed about it has been strengthened by a more intimate acquaintance with it. We think that every pharmacist of the country would find it of advantage to give it a place in his library.

An article of special interest is that on the Thyroid Gland, which is being so extensively employed at the present time in treating myxœdema and cretinism; the statements made coincide with some of the experience of the writer.

The statement that "Pilocarpine is so good a myotic as to be rapidly supplanting eserine (physostigmine) for this purpose with some clinicians," will be new to many.

The book is abreast of the day in treating of the newer remedies, such as Eucaine Hydrochlorate (the synthetic substitute for cocaine), Formaldehyde, Nuclein, Thiosinamine and Thymus Gland.

The article upon Diphtheria is a most interesting and valuable one. Professor Hare is strongly in favor of the antitoxin treatment.

It is probably an omission that in the article on Nux Vomica no reference is made to the use of strychnine nitrate in the treatment of acute alcoholism.

C. B. L.

YEAR-BOOK OF PHARMACY. Comprising abstracts of papers relating to pharmacy, materia medica and chemistry, contributed to British and Foreign journals, from July 1, 1896, to June 30, 1897, with the transactions of the British Pharmaceutical Conference, at the thirty-fourth annual meeting, held at Glasgow, August, 1897. J. & A. Churchill. London. 1897.

The foregoing title sufficiently explains the scope of the Year-Book, and it only remains to be said that this year's volume is fully up to the standard of its predecessors. Its compactness is a valuable feature, which is obtained by the elimination of all unnecessary matter.

CONTRIBUTIONS FROM THE BOTANICAL LABORATORY OF THE UNIVERSITY OF PENNSYLVANIA. Philadelphia. 1897.

This is the third and last number of Volume I, and contains the index to the volume. The first number was issued in 1892. The present number consists of about 160 pages of text and nineteen plates. The following subjects are considered: "A Chemico-Physiological Study of Spirogyra nitida," by Mary E. Pennington, Ph.D.; "On the Structure and Pollination of the Flowers of Eupatorium ageratoides and Eupatorium cœlestinum," by Laura B. Cross, Ph.D.; "Contributions to the Life-History of Amphicarpæa monoica," by Adeline F. Schively, Ph.D. All of these give abundant evidence of creditable research work.

L'AZOTE ET LE VÉGÉTATION FORESTIÈRE. Par E. Henry, Chargé de Cours a l'École Forestière. Pp. 23. Nancy, France. 1897.

ON THE MECHANISMS IN CERTAIN LAMELLIBRANCH BORING MOLLUSCS. By Francis Ernest Lloyd. Pp. 17 and two plates. Reprinted from *Transactions* New York Academy of Science, August, 1897.

SEMI-ANNUAL REPORT OF SCHIMMEL & CO. Leipzig and New York. October, 1897.

The novelties prepared and studied during the past six months were: Savory

oil, from Satureja hortensis, L.; mountain savory oil, from Satureja montana, L.; balsam tansy oil, from Tanacetum balsamita, L.; and Xanthorrhœa gum oil, from Xanthorrhœa hastilis, R. B.; and some other species. There is also much other information of value in the 88 pages that make up the pamphlet.

INDEX-CATALOGUE OF THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE, U. S. ARMY. Second Series. Vol. II. B to Bywater. Government Printing-Office. Washington. 1897.

## MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, November 16, 1897.

The regular Pharmaceutical Meeting was held at 3 P.M., with J. W. England in the chair.

The minutes of the last meeting were allowed to stand as published.

Dr. John W. Harshberger, of the University of Pennsylvania, favored the audience with an address on the "Vegetation of the Yellowstone Hot Springs," which was not only highly scientific, but at the same time replete with vivid descriptions of the numerous phenomena which delight the naturalist in our National Park in Wyoming.

In closing, the speaker fittingly indulged in speculation concerning the origin of life on the earth, and asked the question whether the facts he had presented did not point to hot springs as the origin of primeval organisms.

In replying to a query as to the medicinal virtues of the water of the hot springs, Dr. Harshberger said that he believed they were attributed to the inorganic constituents.

The chairman remarked that he had been of the opinion for some time that the efficacy of many of the so-called medicinal waters depends more upon their purity than upon the amount of mineral salts, inasmuch as these are present in very small proportion.

Dr. C. B. Lowe coincided with this view and attributed their usefulness to a mechanical action rather than to any intrinsic qualities.

Charles H. LaWall communicated some analytical data which he had obtained during the year, in a paper entitled "Laboratory Notes."

Replying to a question concerning the use of Japan wax, Mr. LaWall said that it is used in the laundry business and also for making pomades.

Prof. Henry Trimble presented a paper on "Pomegranate Rind." In commenting upon the quantity of tannin present in this substance, he said that 40 per cent. had been reported in the wild variety. A number of the Spanish fruits were exhibited, and those who had never eaten of them were given an opportunity of testing the merits thereof.

Dr. Harshberger remarked that in Mexico the pulp of this fruit is used for giving a red color to different kinds of drinks.

Having recently been engaged in an examination of willow oak (Quercus Phellos), Prof. Trimble called attention to the leaves and acorns of this plant, and also to the leaves of Quercus imbricaria, to show the difference in appearance of these two species. In the course of his remarks, he alluded to the interest which Prof. Procter had taken in Quercus heterophylla, Bartram's oak, some thirty-odd years ago.

Some cabinet specimens were presented as follows :

Samples of monobromated camphor and salol by Mr. LaWall, and a handsome specimen of metallic bismuth by Mr. Harry B. French.

On motion, the meeting adjourned.

T. S. WIEGAND,
*Registrar.*

## NOTES AND NEWS.

*Formaldehyde* may, in the near future, become of considerable industrial value in addition to the use it already has in medicine. Prof. C. S. Dolley has recently secured a patent for its use in the manufacture of leather. Hides or skins, prepared in the usual way for tanning, are subjected to the action of formaldehyde of a strength gradually increasing from 3 to 10 per cent. About one hour's treatment completes the process. Or the hides are exposed in a closed chamber to gaseous formaldehyde, either by itself or in conjunction with aqueous or alcoholic vapors.

*The Plant World* is a new monthly journal of popular botany. The first number was issued October 1st, and contains papers on "The Sword Moss," by Elizabeth G. Britton; "The Families of Flowering Plants," by Charles Louis Pollard; "Sensitiveness of the Sundew," by F. H. Knowlton; "Ferns of the Yosemite and the Neighboring Sierras," by S. H. Burnham; "Some Sand-Barren Plants," by Willard N. Clute; Editorials, Notes and News. F. H. Knowlton, Ph.D., of the U. S. National Museum, Washington, D. C., is editor-in-chief, assisted by six associate editors, all well-known writers on botanical subjects. Willard N. Clute & Co., Binghamton, N. Y., are the publishers.

## OBITUARY.

Prof. Dr. L. A. Buchner, who, during a long and honorable career, was identified with the sciences of medicine and pharmacy, died at Munich, October 23d, in the eighty-fifth year of his age.

He was the son of Prof. Johann Andreas Buchner, the founder of scientific pharmacy in Germany, and naturally followed in the footsteps of his distinguished father. He served his apprenticeship in Nürnberg, after which he studied in Munich, Paris and Giessen. In 1839 he received the degree of Doctor of Philosophy, and in 1842 graduated in medicine. Later became a member of the Medical Faculty of the University of Munich, and in 1852 was named Professor of Pharmacy and Conservator of the Pharmaceutical Institute. In 1871 Buchner was appointed a member of the Berlin Commission for composing the German Pharmacopœia, on which he wrote a very complete commentary. In addition to much other literary work he was, after his father's death, editor of the *Repertorium für Pharmacie* for twenty-five years.

The deceased was highly esteemed by his associates, and his kindly interest in the welfare of his students earned for him the title of "Vater Buchner." He was the possessor of several honorary titles, and was a corresponding member of the Philadelphia College of Pharmacy.

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## TO VOLUME 69 OF THE AMERICAN JOURNAL OF PHARMACY.

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American Journal of Pharmacy, 69, 1897.

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